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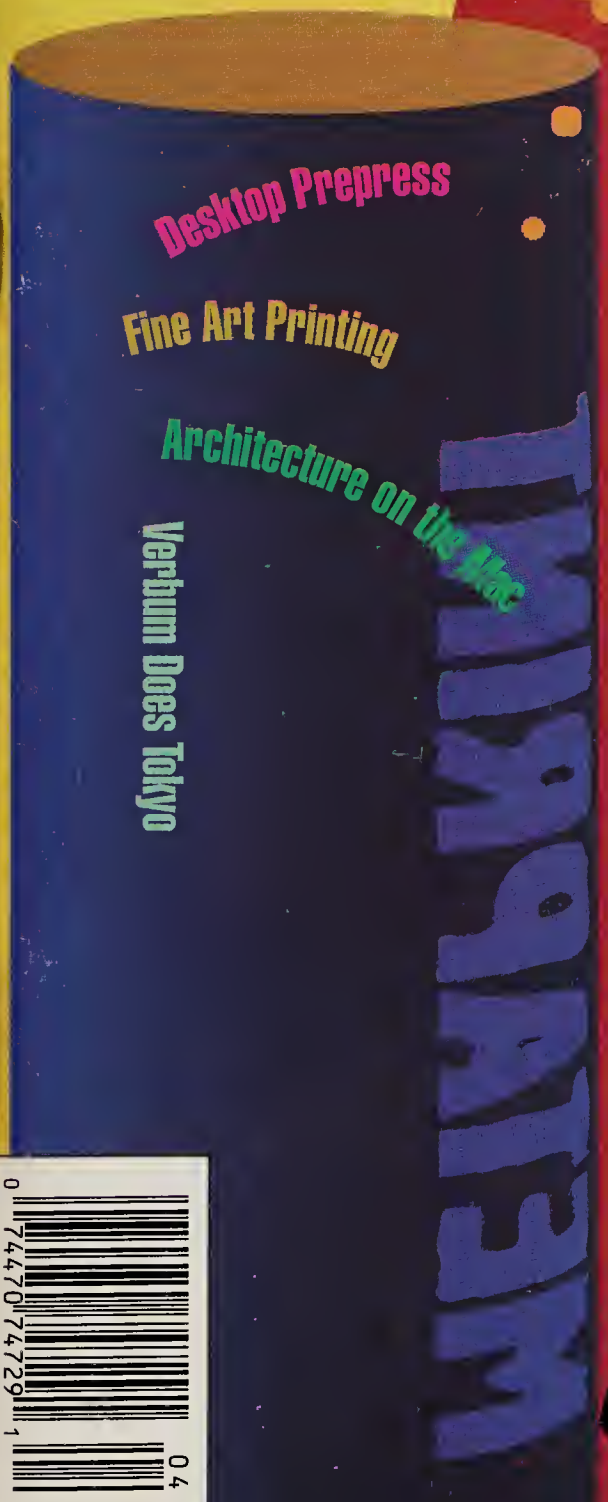

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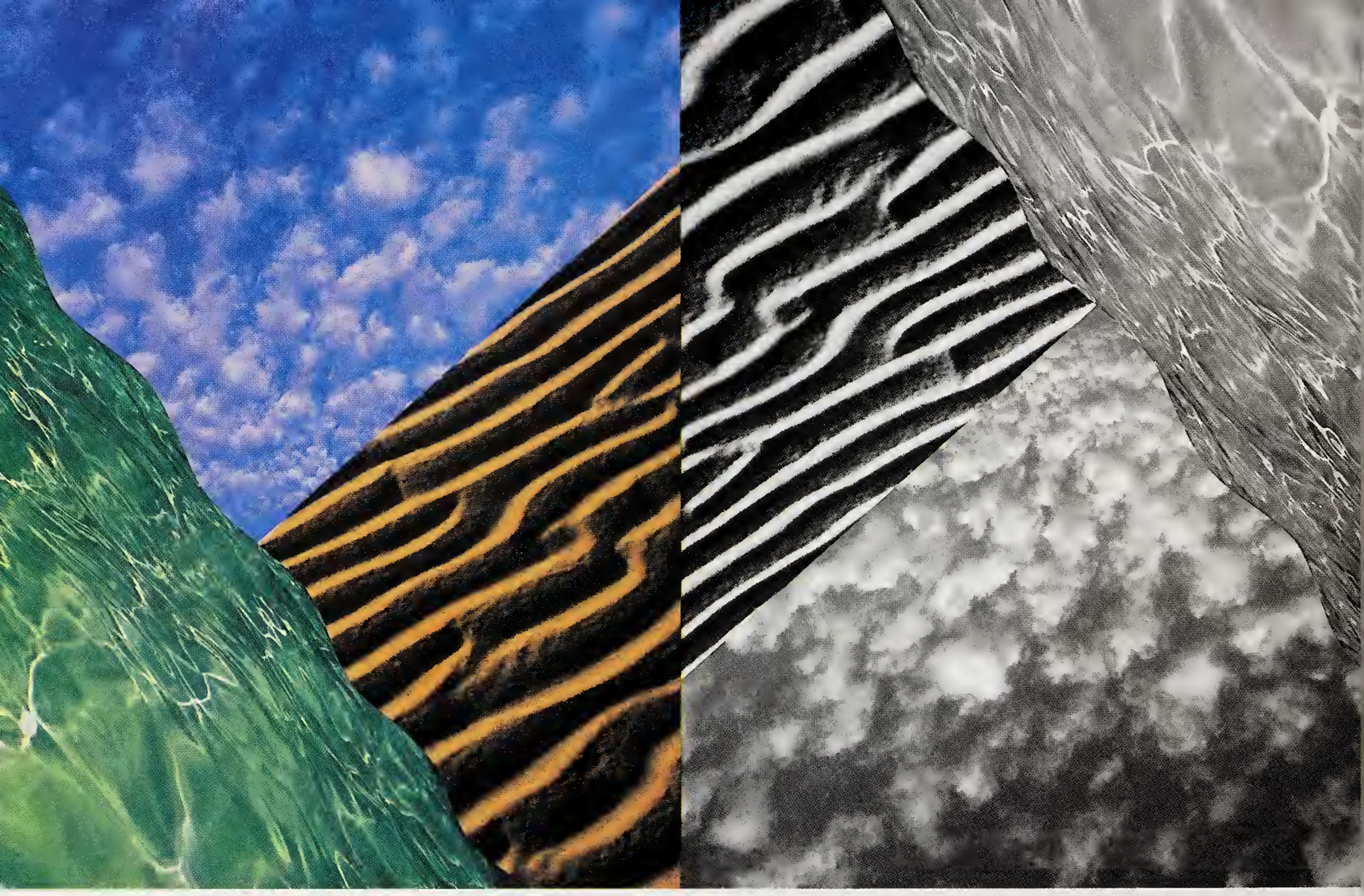

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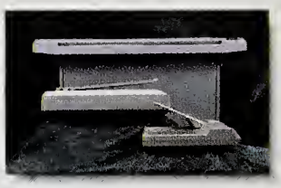

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Submissions
For information on how and what to submit and where to send it, see page 43.

Cover Art
This issue's cover illustration was developed by John Odam with Aldus FreeHand 2.0.

Frontispiece
"Dancing Is Best" by Bonnie Meltzer, using SuperPaint and the Kroy Kolor system (see Gallery).

Verbum 3.4 Production Notes
This issue of *Verbum* was produced with Aldus' PageMaker 3.02 Color Extension on a Macintosh II, IIx, and IIci. Proofs were run on the Apple LaserWriter IINTX and the QMS ColorScript™ PostScript printer. Final b&w pages were run on film through a Linotronic L-300 at 2540 dpi. The 4-color bitmap subjects on pages 13, 29, 32, 33, and 34 were separated with PixelPaint 2.0 and stripped in place by the printer. The cover was separated with FreeHand 2.02 and all editorial color pages, PostScript illustrations in place, were separated by PageMaker Color Extension and run as 4-color Lino film negatives at 2540 dpi. Pages 14-17 were separated by Widen Colourgraphics using the Visionary Software link to the Scitex high-resolution color separation system.
Central Graphics and Laser Express, both in San Diego, provided the Lino output. *Verbum* 3.4 was printed offset by Pendell Printing of Midland, Michigan.

INTRO

About This Issue

We conceived the "Metaprint" issue as an exploration of the new pc-based four-color separation technology, with a focus on printed output of all kinds.

Following this theme, we here explore several dimensions of graphic reproduction with pc's. In producing this output-oriented issue, we used the Visionary/Scitex desktop-to-prepress system for separation and composition of final film for pages 14–17 and PageMaker Color Extension to output 4C film for all the other color pages (see Production Notes on page 2 for details).

This issue's "Look and Feel" column tackles "*Perestroika*, Art and Microcomputers," Linnea Dayton's recounting of her recent experiences on a trip to the Soviet Union. Steve Hannaford reports on desktop color, a complex subject of interest to all electronic artists and publishers, in "Against the Grain." "First Contact" by John Odam treats PhotoMac, the first powerful color-image manipulation software for the Mac. A warm welcome to Mike Kelly, taking the helm of "New Frontier Products," which will expand in 1990 under his direction. (Thanks to Paul Goethel for his previous work on this important column.) We are pleased to introduce "Neomedia," a new regular column by *Verbum's* multimedia editor, David Traub, who will be reporting from MIT's Media Lab and other media origin points. The Metaprint Gallery focuses on works that exemplify high-quality output solutions.

Features in *Verbum* 3.4 include a photo report on Imagine Tokyo '89, the major new version of *Verbum's* ongoing pc art exhibit held September-October 1989 in Tokyo's Sogetsu Kaikan and Konica Galleries. "Pixels at an Exhibition" by Brian Alexander studies the transition of pc-generated fine art from art-world curiosity to gallery sales. Steve Hannaford delivers insights and advice from those on the cutting edge in "Separation Anxiety." Finally, Phil Inje Chang reports on Architectural CAD on the Macintosh, detailing a wealth of visualization and design tools.

Verbum This Year/Next Year

The year 1989 was *Verbum's* third season, and it was real. Seriously. As did the pc graphics industry, we came of age. The technology we use has matured, and the market is following suit. Thanks to the enthusiasm and hard work of early dtp graphics pioneers, today's new electronic designers and illustrators are enjoying powerful, bug-free software and refined hardware platforms that make the conversion experience more fun and less frustrating than in years past. ("Conversion" in this case means an art facility's transition to electronic tools. But there is a personal awakening often associated with the change, isn't there? Why else do people stay up all night and call each other constantly and go to user groups and read books and magazines—"Hello. Is this Verbum? I want a subscription and all the back issues. Can you send them today? By the way, I was looking at a color monitor. Do you recommend..." It can get a little crazy. Artists are prone to passion, and the pc art tools tend to excite the excitable...) As of 1989, there is no longer any question about it. The electronic art studio is no longer a dream. This is reality, folks.

Next year? We're not going bi-monthly just yet. But we are growing: our pages and circulation will expand significantly in 1990 (40,000+ distribution). And we look forward to covering some stimulating new topics such as still video, NeXT, Blendo, and the "smart studio," as well as exciting new products as they emerge. We'll also continue *Verbum*-style coverage of typography, animation, multimedia, PostScript, color output, and the many

Michael Scaramozzino
Lucid Beginnings
(Crystal Ball)
An 11" x 14" document, drawn with FreeHand 2.0. There are no scanned images used in this remarkable PostScript illustration.

Glenn Mitsui
Republic of Design
T-Shirts
These "postage stamp" T-shirt designs were developed by M Design's Glenn Mitsui using FreeHand on a Macintosh II.

subjects of ongoing interest to electronic artists.

Verbum will also be expanding its publishing horizons in 1990. We're currently developing the *Verbum* Electronic Art and Design Series, eight books covering PostScript Illustration, Electronic Page Design, Bitmapped Illustration, Digitized Imaging, Digital Typography, 3D Graphics, Animation and Presentations, and Hypermedia Design, all for publication in 1990 by M&T Books (Redwood City, CA). These quality, 8-1/2 x 11-inch books will include color signatures and will feature projects by top artists. Similar to our project treatments in *Step-by-Step Electronic Design* (the monthly newsletter we produce in association with *Step-by-Step Graphics* magazine), each project will be recounted in detail, following the creative process as well as the technical steps. Like *Verbum*, these books will be a showcase of cutting-edge creativity in the new digital media, with generous galleries of terrific art. More on the *Verbum* series and other publishing developments next issue.

The upcoming issue of *Verbum*, by the way, will feature a special section on typography, certainly a provocative subject to digital artists these days. In celebration of Earth Day 1990, issue 4.1 will also include an "Earth Gallery." Submissions, as always, are welcomed.

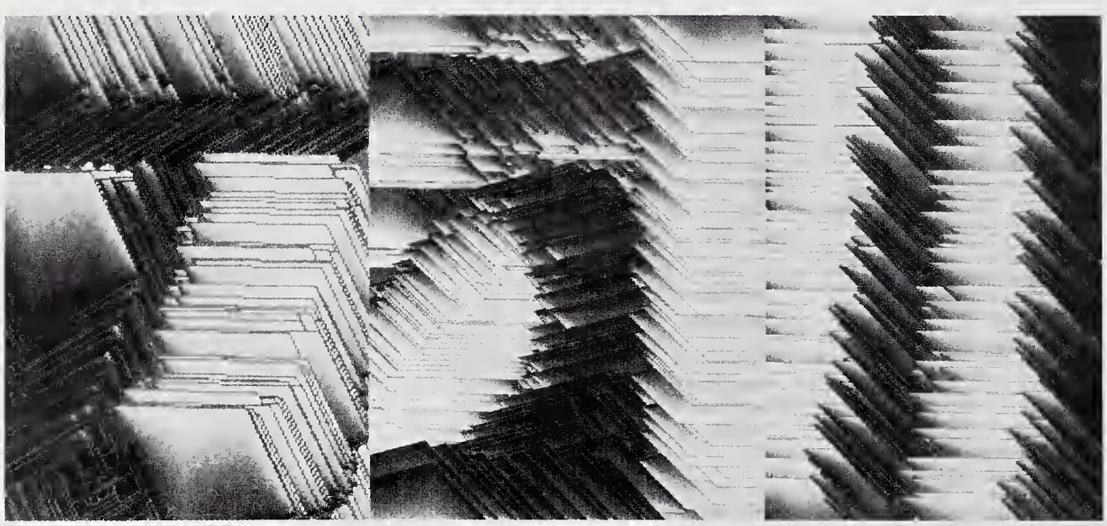
Designing the '90s

Here we go, heading into the final decade of the millenium. As Bill McKibben notes in his recent landmark book, *The End of Nature*, "2010 is almost as close as 1970—closer than the breakup of the Beatles—and the turn of the century is no further in front of us than Ronald Reagan's election to the presidency is behind... we live in the shadow of a number [the year 2000], and that makes it hard for us to see the future." If 1989 is any indication (awesome political change around the world and a new wave of soul-searching and social consciousness in the vast ranks of the U.S. baby-boom generation), the '90s will bring a new, clearer vision of the future. The pc and the new media forms it is spawning will contribute mightily to this process of visualization, education, and change.

Designwise, what's it gonna be? Well, Steve Jobs would vouch for the cube as a prominent icon. (When will the NeXT cube be offered in designer colors? C'mon, all this black is boring. I want mine in turquoise.) But I don't know, all this Italian stuff is getting old. Italian design was the theme of the Aspen design conference last summer, and it seemed kind of stale. With all due respect to the arbiters of international design trends, I think we need some fresh input. Certainly U.S. design forces such as April Greiman will continue to meld traditional and digital tools in the crafting of the latest design wave. And creative lights in the new United States of Europe will continue to define the modern look. But we need new influences. I kind of like some of the thought-laden Russian design and illustration we saw recently here in San Diego at the local AIGA's exhibit of contemporary poster art from the Soviet Union. Japanese design continues to set trends, particularly in industrial design (check out the Sony Mavica and Toyota Celica). But sometimes, like the Italians, Japanese designers are a bit too slick and refined (save the cutesy new wave stuff: "Trendy good time now!"). We need some Mexican color, some Russian weight, some Green organics, some Cyberpunk street smarts, some rap funkiness, some bitmap chunkiness! Movement and synthesis will certainly characterize '90s design. Three-dimensional graphics will become commonplace on the low end. Digitized image collage will be everywhere. So will the Digital Word: typographic, illustrative, and spoken. And "Blendo," a lá Peewee's Playhouse, will meet interactivity on the multimedia pc.

Watch out, 'cause it's a worldly, digitally aided, smart-yet-childlike design wave coming. I have no idea what it is exactly, but it feels like a lot of fun. In the words of Arsenio Hall, our intercultural, musically hip, top-dog talk show dude, "Let's Get Busy!"

Michael Gosney



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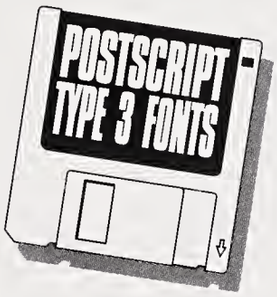

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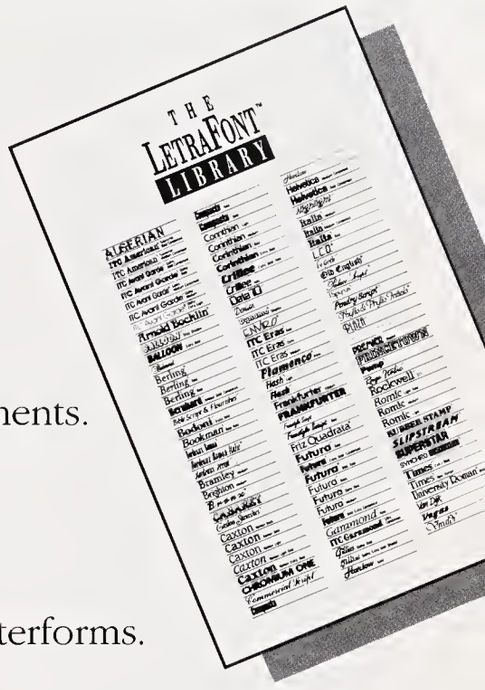

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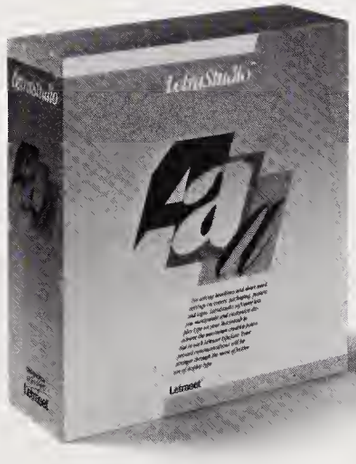

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Perestroika, Art and Microcomputers

■ *by Linnea Dayton*

George Bush and Mikhail Gorbachev have just concluded their shipboard summit in Malta. In the exchange of gifts that must certainly have accompanied such a meeting, I hope George gave Gorby at least one pc. Microcomputers are at a premium in the Soviet Union, as I learned this past summer when I travelled there.

I went to the Soviet Union as part of a Volga River tour arranged by Discovery Tours, a San Diego travel agency, in response to an invitation from a Soviet citizens' group called the Center for Creative Initiatives for Peace, which has connections to the Soviet Peace Committee (a government bureau). The theme for the cruise was "Ecology," and the Center wanted a guest ecologist from Scripps Institution of Oceanography to give a few lectures to the mixed Soviet-American-European-Australian group and to help organize discussions aboard the boat. My husband happens to be such an ecologist. And with a little effort, the travel agent and I talked him into going, and I went along, too. Like the other Californians, Texans, Alaskans, and Canadians on the tour, I planned to do "tourist stuff" in Moscow, enjoy the scenery along the Volga, maybe participate in the ecology discussions and visit the towns where the boat stopped. I thought I might also try out my rusty Russian (not a word of which had passed my lips since I finished a two-year course in college).

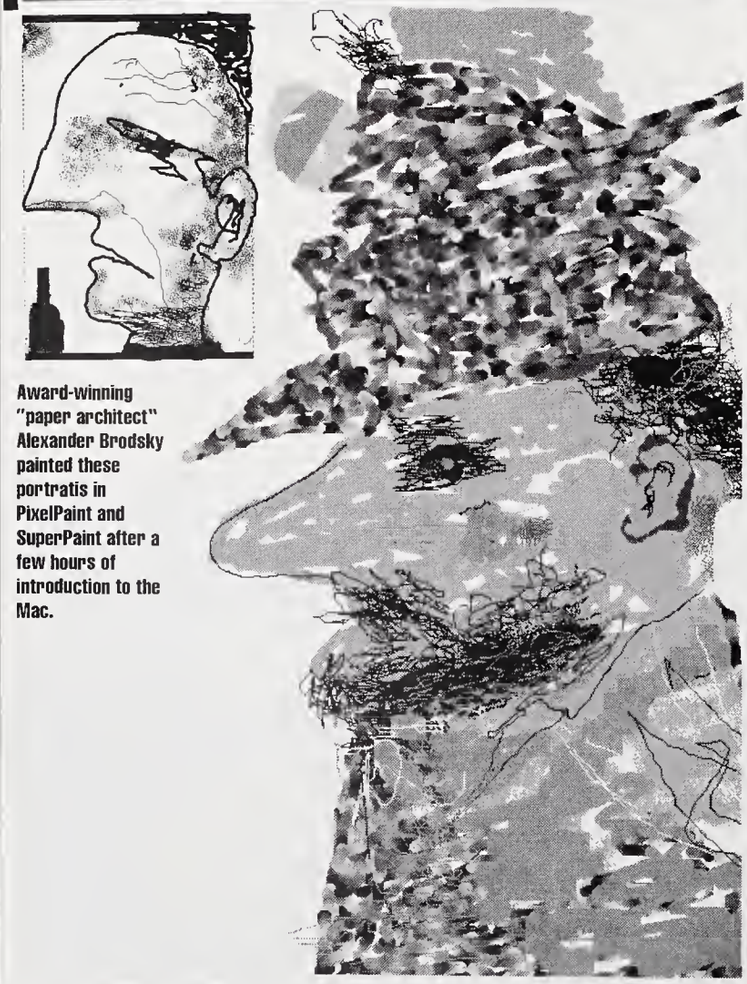
The itinerary included three days in Moscow at the beginning and again at the end of the cruise. So I took along some copies of *Verbum* for Jana Janus, an American serving as Lazergraphics Manager of an AlphaGraphics printshop in Moscow, one aspect of a joint venture between Phargo Management & Consulting Ltd., a Toronto company, and a Soviet book publisher. Except for my AlphaGraphics contact, I thought it was likely to be a computer-free vacation. But as I would begin to find out about a week into the trip, there were other computer connections.

We flew from New York to Moscow on a joint Pan Am–Aeroflot flight. The luggage took a while to arrive on the carousels, but finally it was all collected. Among the duffel bags and suitcases, all tagged with matching tour-group tags, were several brown cardboard cartons, tagged the same way and apparently associated with the Texas group. I didn't think much about the boxes at the time.

When we and our baggage had been rounded up, we cleared customs as a group quite quickly.There were none of the long, steely-eyed stares that my husband, who had been to Moscow about a year and a half before as part of a U.N.-sponsored work group, had warned me to expect. "Must be glasnost," he said, "or perestroika."

The cruise gave us access to some wonderful works of art, in large cities and small towns — architecture and paintings mostly, none of them produced on the computer. On the boat we made friends with two geographers from the Moscow Pedagogical Institute. They had heard that there were two important European paintings in a small museum in a town called Kozmodemyansk. "They're such paintings that people would say, 'I've seen it, now I can die,'" Sasha told us. "The Hermitage in Leningrad has asked them to send these paintings, but they won't send them." By asking directions of people in the streets, we found the unheated, nearly unlit museum. We did indeed see a wonderful collection. The town had been a sort of art colony, home to a number of Russian painters in the late nineteenth and early twentieth centuries. Sasha found the two European paintings he was looking for. "I've seen them, and now I can die," he said as we left.

We also saw a small church-turned-museum in Yaroslavl with beautiful icon-covered (and I don't mean Macintosh) walls and acoustics that could create God if He hadn't existed before. Even the old, scratchy cassette tape of choral music the kerchiefed caretaker was playing sounded good. It must have been wonderful later that day when some musicians from an English music college happened by and provided some live choral music. We were told the caretaker was moved to tears — it was the first time she had ever heard anyone sing inside the church.



Award-winning "paper architect" Alexander Brodsky painted these portraits in PixelPaint and SuperPaint after a few hours of introduction to the Mac.

Enter the Computers

About three days into the cruise I began to hear murmurings about "the computers," which piqued my curiosity. It took me a while to find the source of more information — one of the women from Texas who had shepherded some of the cardboard boxes through the airport luggage area.

"What can you tell me about 'the computers?'" I asked her. The tale she told reveals a bit about *perestroika,* Soviet economics, doing business in the Soviet Union, and the importance of direct communication. It's complicated, and to this day I'm not sure I have it straight.

First a little background about Russian money. At the time we were there, the ruble traded officially at US $1 to .67 ruble. The ruble is not traded against other currency and so has no value outside the Soviet Union. It's very hard for Soviets to buy things made in most other countries, because any rubles the seller collects have to be spent inside the Soviet Union (where there isn't necessarily a great deal one wants to buy that's for sale legally). If the seller needs to import the product, or supplies to make the product, from outside the Soviet Union, he or she can't afford to sell that product for rubles that can't be spent. Baskin Robbins ice cream cones, for example, are available in Moscow, but only for "hard" (Western or Japanese) currency, because the ice cream, cones, napkins, and plastic spoons are all imported from outside. While a Soviet citizen may be able to get together enough hard currency to buy a Baskins Robbins cone (the Russians have very tasty ice cream of their own, but it seems to come only in vanilla), it's not likely that they'd have enough to buy a pc, even if they could find one for sale. Currency restrictions also make it very hard for Soviets to travel abroad. Although apparently it's now much easier than it used to be for average Soviet citizens to get permission to travel outside, when they get to their Aeroflot destination on foreign soil, they're essentially penniless because their currency has no value. As is usual under such currency conditions I suppose, there is a highly illegal black market exchange.

Now a little bit about "cooperatives." As I understand it, a cooperative in the Soviet Union is basically a little piece of capitalism, an entrepreneurial individual or group allowed, under fairly specific, strict, and apparently ever-changing rules, to do business with the aim of making a profit. Many people, for example, sell garden produce. When we were there, one of the rules was that a

cooperative couldn't sell produce for more than twice what it sold for in the state stores. But if the state store didn't happen to have a particular vegetable, what was the limit then? The entrepreneurs tended to set their prices somewhere between what the market would bear and what the state stores would have been asking if they'd had any to sell.

And finally a little bit about the computers. On our tour, all travel within the Soviet Union was to be paid for in rubles. And the Center for Creative Initiatives could get a terrific deal on the Aeroflot tickets. So instead of buying travel, most of the US $2300 collected from each traveller would be used to buy computers in the United States, and these would be brought to the Soviet Union under the aegis of a cooperative that was allowed to import such things. My Texan acquaintance understood all this at the outset, when she volunteered to round up the computers five weeks before departure time. But a number of other conditions that seemed to have "got lost in the initial translation" turned out to be important later.

The people at the Center seemed to know what they wanted: IBM compatibles (because there's apparently a lot of pirated DOS-based software floating around in the Soviet Union) but not IBM brand machines (they aren't totally ignorant of relative prices). They wanted EGA or VGA monitors and wide-carriage dot-matrix printers with 24-pin resolution. My Texan friend thought they were asking for the moon, just to ask for it. But it turns out that the Cyrillic characters required for the Russian language are downloaded from the monitor to the printer, and the higher-grade monitors are needed to handle this alphabet.

It was hard to know exactly how many travellers there would be (and thus how much money there was to spend); the Center kept adding people to the "guest" list — one speaker's wife, another's children — which both reduced the dollar income and upped the expenses.

At some point, the communication confusion kicked in — in earnest. A letter of agreement was profferred and signed for delivery of five computers. There was no mention of printers or monitors, but each computer had to have 20 MB of hard disk space and at least 10 MHz of power. The computer connection in Texas still didn't know how much she could spend, but with only a few weeks left before departure, she thought she'd better keep moving. (It was a good thing she didn't wait until the budget was firm, because that didn't happen until two days before take-off.) Attempts to clarify what was wanted didn't entirely succeed. There was a fax machine at the Center, but people kept turning it off, and the telephone system wasn't 100-percent reliable (rainy weather sometimes interrupts service, for example).

The travel agency did the initial checking with U.S. authorities (the first 50 or so phone calls, as one of the agents recalls) to check the procedure for legally exporting microcomputers to the Soviet Union. It turned out that anything under about 5 MHz could be exported with no permit. But a 10 MHz computer had to have a permit. Getting a permit was basically a sure thing, but it would take a bunch of paperwork and three to four months. This requirement was about to be lifted, they were told, but who could say when?

Since there weren't three or four months to spare and since no one really makes compatibles with less than 5 MHz anymore, the best solution seemed to be to perform a simple operation ("unplugging something inside") that would reduce the power of the 10 MHz machines to legal levels but that could be easily reversed after delivery. Folks at the Commerce Department agreed that this would be a good plan. They also let on that probably no one would actually open up the computers to check on the MHz. But there was no sense taking chances. The five computers that cleared U.S. Customs were completely legal.

There were also five monitors, but just three printers. With money running out (all the printers had to have converters, and cables and switch boxes were needed also) and time getting very short (the last of the computer equipment was Fed-Exed to the ticket counter at the airport), it seemed that the best place to economize was in the printers. "I figured the people at the Center could share printers," she said.

The equipment was boxed in cartons of three different sizes, was shipped and cleared as part of the tour's luggage, and arrived on board the cruise boat in good shape. But the printer shortage turned out to be a problem. Once in Russia, we found out that the computers were not for use within the Center. In a creative initiative of their own the cooperative would sell them (one can only speculate about the price) to individuals who had the money to buy. As far as I know, the printer shortage had to be solved by sharing. Even without the two printers, the computers went over budget. The Texas group sold cruise T-shirts and the travel agency ended up reducing its net profit to $125 to help cover the extra costs.

"They are such paintings that people would say, 'I've seen it, now I can die,'" Sasha told us.

Enter the Artists

Unlikely, you might imagine, that any micro making it to the Soviet Union would find its way into the hands of an artist. But I was told that at least one computer (not necessarily from our batch) is now owned by an artist whose work is not currently appreciated by (and therefore not supported by) the artists' union. Artists whose work is not shown officially hold their own shows in Moscow apartments, and hence their work is called "apartment art." This particular artist's work is recognized outside the Soviet Union as well as inside. He sells some of it for hard currency and so could afford a pc when one happened along.

After the cruise, I found AlphaGraphics (walking into the shop was like opening the door on a piece of the U.S.A.), delivered the *Verbum* copies, and asked Jana if she thought there would be any possibility of a Macintosh graphics workshop or a visit from the IMAGINE exhibit in the next year or so. "I think so," she said. "We're working on arranging a workshop." The Institute for Training Communist Youth has 10 Macs, and AlphaGraphics has several. "It will be like dangling candy in front of a baby, I guess," she said. "But the artists here ought to know what's out there."

Looking Back

"Did you *enjoy* it," a friend asked me the other day about my trip to Russia. "I mean, everyone I've ever talked to who's been there says it was really interesting and they're glad they went, but no one says they really enjoyed it." Well, it *was* really interesting and I *am* really glad I went. And, yes, I *enjoyed* it. Most people there have a hard life, by our standards, but like Americans they walk with purpose, with their heads up. They have a certain cynicism about their government and a sense of humor about the human condition. Their jokes translate into our culture. Their families are close. They look and dress like us. Several times my husband and I were mistaken for Russians as we walked around the streets. People stopped to ask us, in Russian, whether the store down the block was open, or how to get to a particular place.

Russians read a lot, we noticed. Some of the longest lines we saw were at the newsstands, where people lined up in the morning to buy *The Moscow News*, an independent daily newspaper published in nine languages. We bought one or two issues in English and found articles both supportive and critical of Gorbachev's government. The critics espoused positions both to the right and to the left of the government.

Planning Ahead

As we stand ready to take on the challenges of OPI, color separation, and a mushrooming variety in electronic typography, I can't help thinking that in the immediate future quite different challenges will be facing the desktop publisher in the Soviet Union, where citizen-to-citizen communication has not exactly been given high priority in the past; where, we were told, there are no telephone books; where until recently owning a photocopier required a license; and where an advertising program might consist of hanging a sign outside your place of business.

The Soviets have a history of communicating with each other though, even under the less-than-optimal conditions that have existed for almost 70 years — take, for example, the Samizdat writers earlier in this century and the apartment artists of today. And interest is developing in joint efforts between Soviet and outside participants to introduce graphic artists to computers, an interest expressed not only through AlphaGraphics, but also by Oleg Sovostiuk, head of the Soviet Artists' Union, who visited the United States with a Soviet poster exhibit this fall.

In fact, we can preview the kind of work that will result from the pairing of Russian artists and Western microcomputer graphics know-how in the work of two Moscow "paper architects," Alexander Brodsky and Ilya Utkin, creators of fantastic buildings in pen and ink, who were very briefly introduced to the Macintosh in a workshop held at Platt College in San Diego to provide user-friendly exposure to the computer for artists established in other media. Now that *glasnost*, *perestroika*, and microcomputers have arrived in Moscow, we can look forward to some distinctively Soviet "output."

AGAINST THE GRAIN

DESKTOP COLOR REPORT

■ *by Steve Hannaford*

The microcomputer-based color prepress market has shown significant progress over the past year, progress that illustrates perfectly the way sharp competition in the right field can cause rapid and amazing developments. This progress has never been linear, never very predictable. The advances most commonly expected seem to arrive on schedule. But new and unexpected hurdles appear that must be leapt before progress can be made. And breakthroughs in areas that the pundits were hardly paying attention to cause ripples through the whole industry and result in major advances.

You might say that we all carry a double clock in timing these changes. Taking a long-range view, the accomplishments of desktop prepress over the past few years are spectacular. Typesetting, line art, page layout for magazines, newspapers, brochures, and a hundred other areas are being increasingly dominated by PostScript-based page creation. While color is still in its juvenile stages, each week sees new documents, new techniques, and an increasing mastery of desktop color—very significant progress.

On the other hand, to those who wait each day for the big bang, desktop color appears to be spending a lot of time idling. Every month it seems that the technology is about to make dramatic advances, and yet the advance seems glacially slow. The companies (vendors and resellers) who have wagered a lot on this technology are hoping that it will all develop at once, but there are still substantial problems. For every obstacle overcome, it seems that several new ones show up.

Part of the problem comes from taking the very highest-quality output and using it as a baseline. True, there's no way to configure a 100-percent desktop system to produce the best magazine-quality color photo work using current software and hardware. The state of scanning, color halftoning, and color correction is not equal to the high-end color services provided by the best color houses. As with all new technologies, there's a shakeout and experimentation period as the limitations of each new step forward are discovered and corrected. But in less exacting areas, the use of desktop color is growing, and all indications are that it will dominate the color prepress world in the very near future. Even with the imperfectly integrated tools that currently exist, people are making this technology work today in a variety of different situations.

Levels of Color

Traditional divisions of color prepress work are starting to change. The current feasibility of doing four-color separations of nonphotographic work, such as illustrations, has created a new and growing market. In these cases, where exact color matching is rarely critical, the new technology has a substantial advantage over the old, thanks to the ease of making corrections and variations.

Spot Color

A year ago, some designers were beginning to take advantage of spot color, designating areas of specific color on a page, by using facilities in page-layout programs. Now spot color has become almost routine. Service bureaus throughout the country are running spot-color overlays, and printers are starting to get used to receiving film negatives for spot color. There are still problems, however: the principal programs still do very little or nothing to handle abutting colors. Computer-generated trapping is still in its infancy. This feature is critical, since building in tolerances for the variations on a standard press has been a traditional prepress job.

Color Illustrations

The most spectacular growth has been in the use of color illustrations. Drawings from FreeHand, Illustrator, or MacDraw are getting more and more commonplace—in magazines (like *U.S. News and World Report* and *Business Week*), in newspapers (like *USA Today*), in books (several Time-Life series), and in brochures, pamphlets, and all kinds of printed materials. These color illustrations, under the name of "info graphics," have mushroomed of late, changing the way factual information is illustrated. Replacing expensive and finely crafted airbrush art, such illustrations are making widespread use of informative color graphics no longer a luxury restricted to a few special occasions. We now regularly see elaborate and classy color drawings with subtle shadings and tints, produced in a volume unimaginable using traditional means.

Color Photos

Just as black-and-white photography is only gradually seeing photos created digitally with imagesetters, so the area of color reproduction has moved quite slowly to take advantage of the new technology. The problem here is that photos have to match colors out in the real world, while with illustrations a near miss is good enough. Particularly difficult are those colors, like flesh tones or gold, that are both complex to create with halftones and narrowly defined in our minds.

Occasional color photos are being printed from desktop equipment, especially in newspapers. The *Dallas Times-Herald*, for instance, has used such separations to create color photos based on video-frame capture from a TV broadcast. For example, a TV news frame of House of Representatives Speaker Jim Wright giving his resignation speech ran last summer—it was the fastest and most immediate way the paper could get a color photo to meet its deadline. Likewise, the *Times-Herald* has experimented widely with digital still cameras for routine color photos, bypassing the use of conventional cameras. In another area, the computer weekly *MacWeek* is just starting to publish all news photos using off-the-shelf hardware and software.

With some of the more elaborate desktop systems, like CyberChrome and Pre-Press Technologies, more elaborate color output is beginning to appear, particularly for such color-intense applications as catalogue creation. While to my knowledge there are no more than a dozen users of these systems, these pioneers have produced some very impressive results. The engineering groups behind the products are getting more and more sophisticated, and are making use of improved technology throughout the industry. Although it's still an open

question as to whether any of these dedicated systems will take over a fiercely competitive market, they certainly have demonstrated their ability to create publishable color photos.

The High-End Links

High-end color systems are under development by companies such as Scitex, Crosfield, and Hell, the major players in high-end color-separation technology, all of which offer ways for desktop publishers to make more direct use of their systems. Their approaches differ both in interface and in capabilities, but they all extend the feeling of working with a page-layout program on a desktop system and doing everything but the final color work on a microcomputer (currently, always a Mac).

A year ago the intentions of these companies were viewed with a great deal of skepticism. Crosfield's and Scitex's early desktop offerings were incomplete and somewhat half-hearted. The feeling was that they didn't really want to cannibalize their own customer base by offering a lower-priced product. But with their improvements and expansions in their programs, the rate of their product updates, and their stalwart commitment to the desktop-based market demonstrated at shows, the high-end vendors do seem to see this market as part of their future.

Scitex with its Visionary and VIP programs, Crosfield with its CLS and Studio-Link products, and now Hell Graphics with ScriptMaster all offer various ways for graphic designers and publication managers to take a desktop publication three-quarters of the way, and then allow for the professional color work (trapping, color balance, the final color scan, and color separation) to be finished off at a professional color house.

It makes sense to separate the artistic and design work from the color craft work, since most designers don't want to get involved too deeply with the nuts and bolts of getting acceptable colors from the printing press.

It makes sense to separate the artistic and design work from the color craft work, since most designers don't want to get involved too deeply with the nuts and bolts of getting acceptable colors from the printing press.

Unfortunately, these systems all still have serious limitations and are not yet perfectly integrated into the desktop production environment. For example, all currently require the use of Bitstream fonts, a not entirely comfortable solution for designers with major commitments to Adobe fonts.

But there are rumblings. Scitex, especially, is poised to offer new connectivity to PostScript in the upcoming year, though the details are still fuzzy. The sense I get from talking to these companies and to the color shop operators is that they're aware of the enormous PostScript-caused changes that overtook the typesetting business in the last year and don't want to get caught unaware by a similar restructuring of the color prepress industry.

The Fruits of Capitalism

Paramount in this restructuring is competition, but not the hollow competition praised so often by our politicians. Their sympathies are usually with the mastodons of American capital, the Fortune 500, entities big enough (like IBM) to persuade others to follow along with their mistakes and pretend they were just what was wanted. For these companies, competition means getting you to choose between Coke and Pepsi; Fords and Chevies; or better yet, Classic Coke, Cherry Coke, Diet Coke, and Caffeine-Free Coke. But we all know that actual competition occurs not in the world of the Fortune 500, where the only fight is for market share. The true blessings of capitalism result from the tooth-and-claw fighting that occurs in the really competitive segments of the market. In this chaotic environment, competition is the spur that moves technology forward. In no area is this truer than in computer technology, where innovation and breakthroughs come in amazing and often unpredictable ways that reshuffle the deck of priorities. In an industry like electronics, where real superiority of features or reductions in prices can lead to rapid success, the pressure is always on to make improvements and add new features.

Calibration

The color prepress market provides some excellent examples of technological progress. For instance, a year ago no one talked about screen calibration, the adjustment of a color monitor to some predictable standard so that work done in color on a terminal would have a close relationship with the eventual printed output. But in the last few months, the issue has become a major one, with both Barco (through RasterOps) and Radius offering color calibration solutions for the Macintosh.

This activity was based on a real need. Once the other tools for color production started getting decent and the simplest obstacles to color separation were overcome, desktop color service bureaus ran smack into a new wall. Conventional video terminals display color differently from one another, and from themselves even, based on internal and ambient heat and other factors. As a result, the color you're looking at today might bear only a casual relationship to the color you look at tomorrow—and the relationship to the final color is even more unpredictable.

Calibrated monitors allow operators to adjust the color settings to a preset standard, and with the Barco/RasterOps design, it's possible to create your own standards and save them on disk, to be used at another time or to be brought to a second terminal. In addition, the more sophisticated (and expensive) Barco/RasterOps monitor keeps track of its own settings, monitoring itself to catch any changes and readjusting the look of the monitor.

Calibration, while not perfect, allows the user to adjust the screen output with some accuracy and work in something approaching real color on the screen. But as a result, problems further along in the color process are more noticeable and put pressure on other aspects of the system for a solution. In the area of calibration, the competition is breathing down the front runners' necks, and it's a sure bet that in the near future prices will come down and new products will appear.

Other Changes

Until recently, Linotype had a virtual monopoly on PostScript imagesetting. But a wealth of competitors (Compugraphic, Varityper, Monotype, Ultre, Optronics) have since entered the market and started competing on price, performance, and service. A truly amazing variety of technol-

continued on page 11

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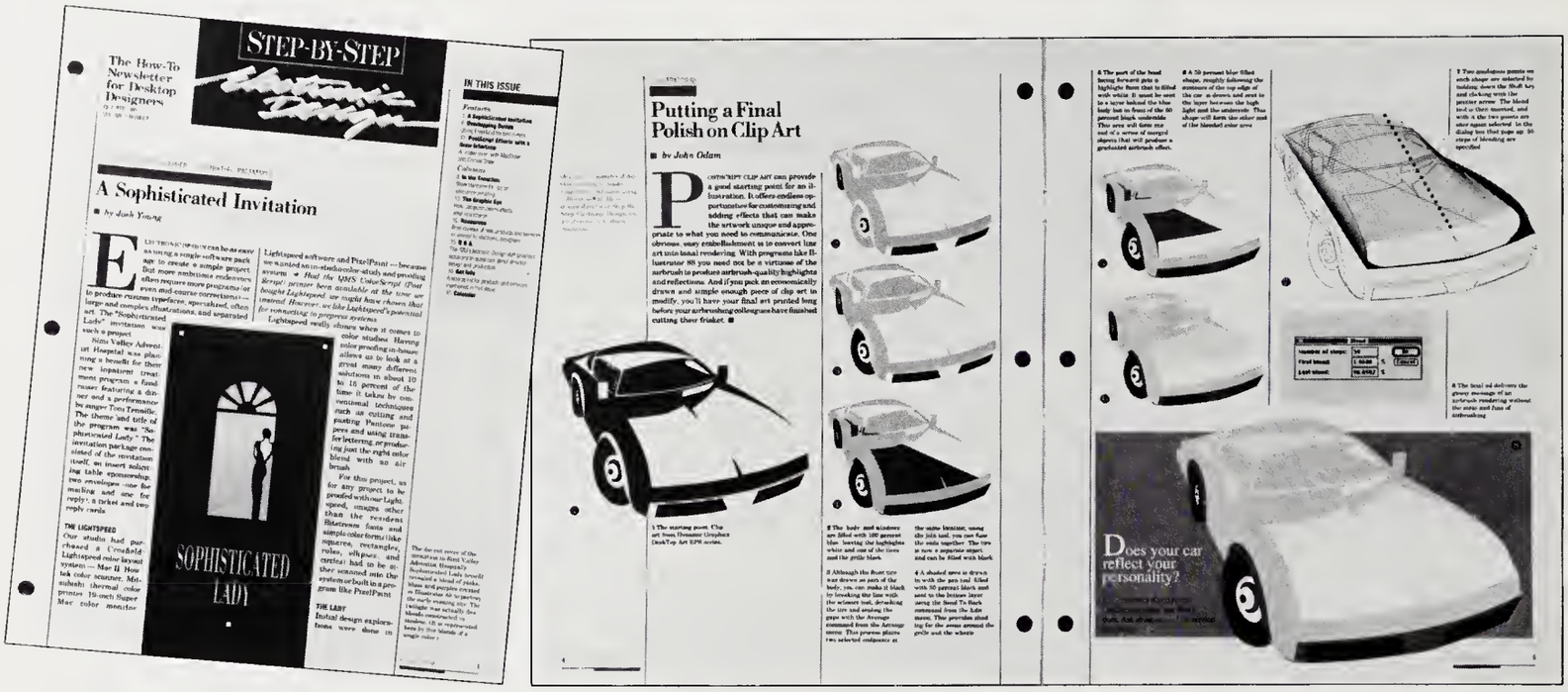

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from page 9

ogies, page sizes, and add-ons are beginning to be available.

Much the same has happened in the area of color scanning. Microtek came out this fall with a color-scanning solution for less than $3000, retail. The color scanning available on the machine is not inferior to color scanning on similar, much more expensive flatbed models. (Some of my sources say it's better!) In the middle range over the past year, Nikon and a new American company called Array have introduced new transparency scanners, and Barneyscan, Howtek, Nikon, and Truvel, the current leaders in the mid-range scanner department, suddenly find themselves with ever more serious competition. Meanwhile, Optronics and possibly Dainippon Screen are about to introduce desktop drum scanners. These high-end scanners, priced at a modest (for drum scanners) $60,000 or $70,000, are likely once again to revolutionize the scanning process.

One area that still separates the high-end color solutions from the PostScript pretenders is the subtlety of the halftoning. Published color is based on the arrangement of cyan, yellow, magenta, and black halftone dots into patterns called rosettes, in which the dots are juxtaposed in a way that creates the illusion of a wide range of colors. Really sophisticated schemes, like the ones patented by Hell Graphics, allow for numerous tricks to keep the illusion of continuous tones alive, even when the repetitive pattern threatens to betray itself. These techniques include various levels of randomization, reshaping dots, skewing, and other refinements that are based on many years of research and observation. PostScript is still, relatively speaking, in its infancy, and is just overcoming some of the most basic limitations of its very rigid halftoning screen. As a result, moire problems and other obvious defects are common in PostScript. On top of this, competitors' patents block the most obvious and elegant solutions to these problems, and enmesh the area of high-end color in a web of legal issues.

Despite major obstacles, dramatic advances have been made this year. Adobe itself has made solid gains with its Photoshop product. Optronics is offering its own halftoning scheme. A Spanish firm called The Color Group is selling an alternate halftoning scheme that also has attracted serious attention. And Scitex may be about to loose its techniques into the PostScript arena.

Right now the bottom line in color technology is the competition for market share. The financial opportunity is attracting development plans from a variety of companies, small as well as large, and a host of alternative solutions will be given a chance to win supremacy. As we'll see in the months ahead, in an environment where change is expected and customers are in search of the best, the least expensive, and the easiest-to-use technology, traditional loyalties and big names count for virtually nothing.

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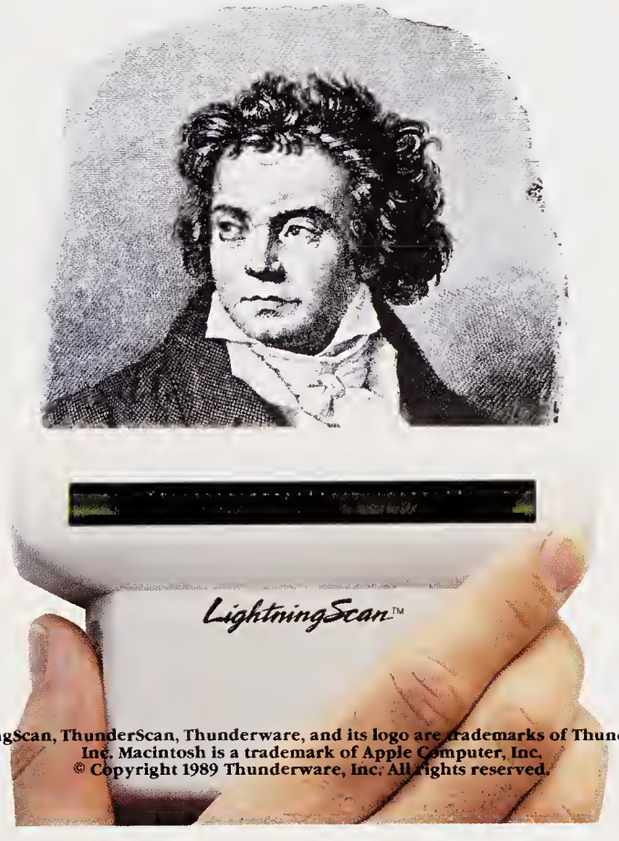

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FIRST CONTACT

■ *by John Odam*

PhotoMac 1.1
Avalon Development Group
1000 Massachusetts Ave.
Cambridge MA 02138
617-661-1405

Using PhotoMac for the first time heightened my awareness of a fork in the road of progress in desktop color production: to what extent do designers need to become involved in editing continuous-tone color images? Is it enough to scan one's color photos or artwork, scale them, crop them, and incorporate them into our layouts, or do we want to have the the power to control the color and density of the minutest area of a color separation?

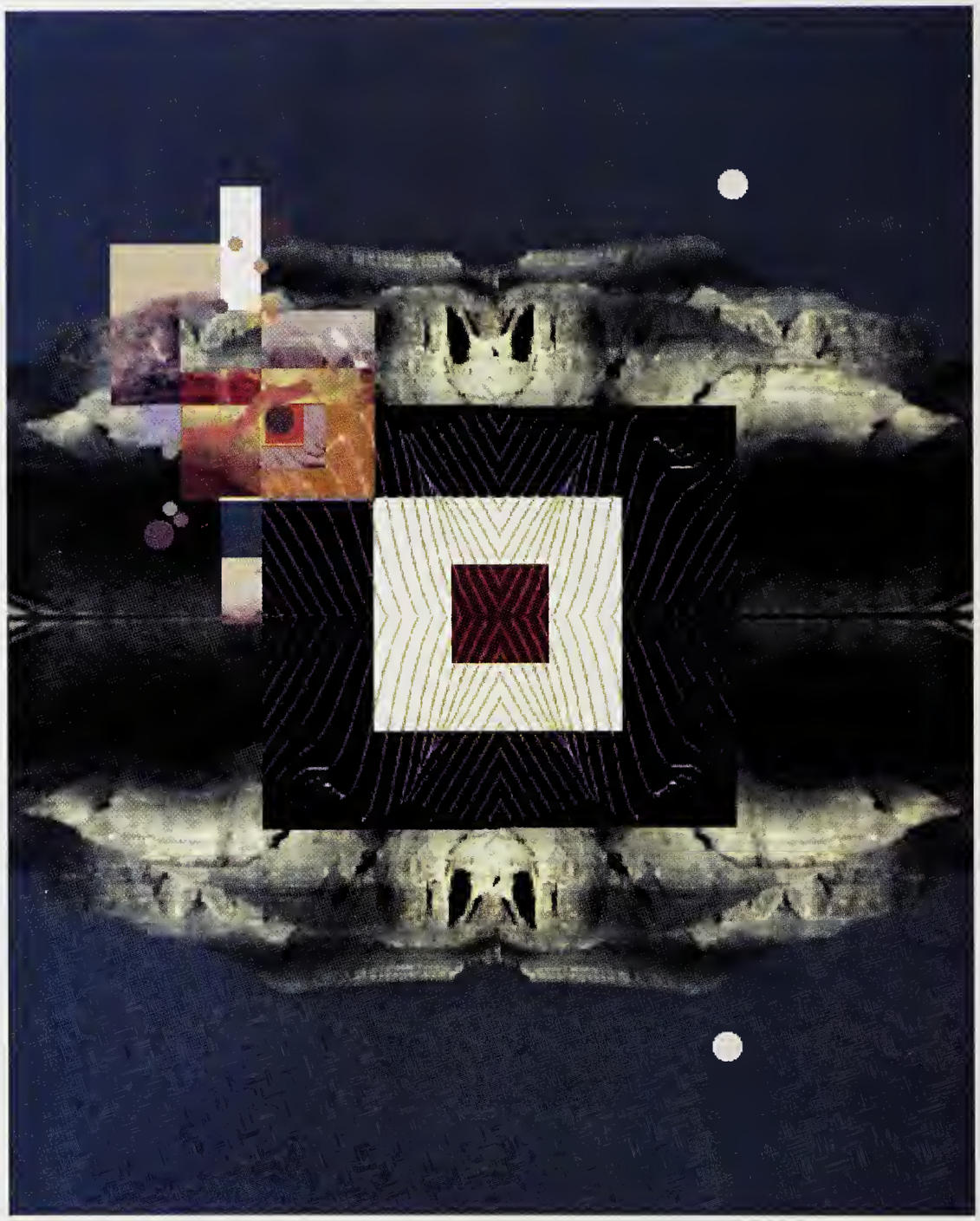
PhotoMac is a program that straddles the issue. It will allow individual color TIFF scans to be edited, cropped, and color separated on the Linotronic L-300. At the same time PhotoMac has some fairly powerful photomontage functions that resemble their monochrome counterparts in Image Studio and Digital Darkroom. As page-layout programs continue to improve their color separation capabilities, graphics files will be separated directly through the layout program, as is the case with the graphics on the two pages of this article.

Looking for edges...

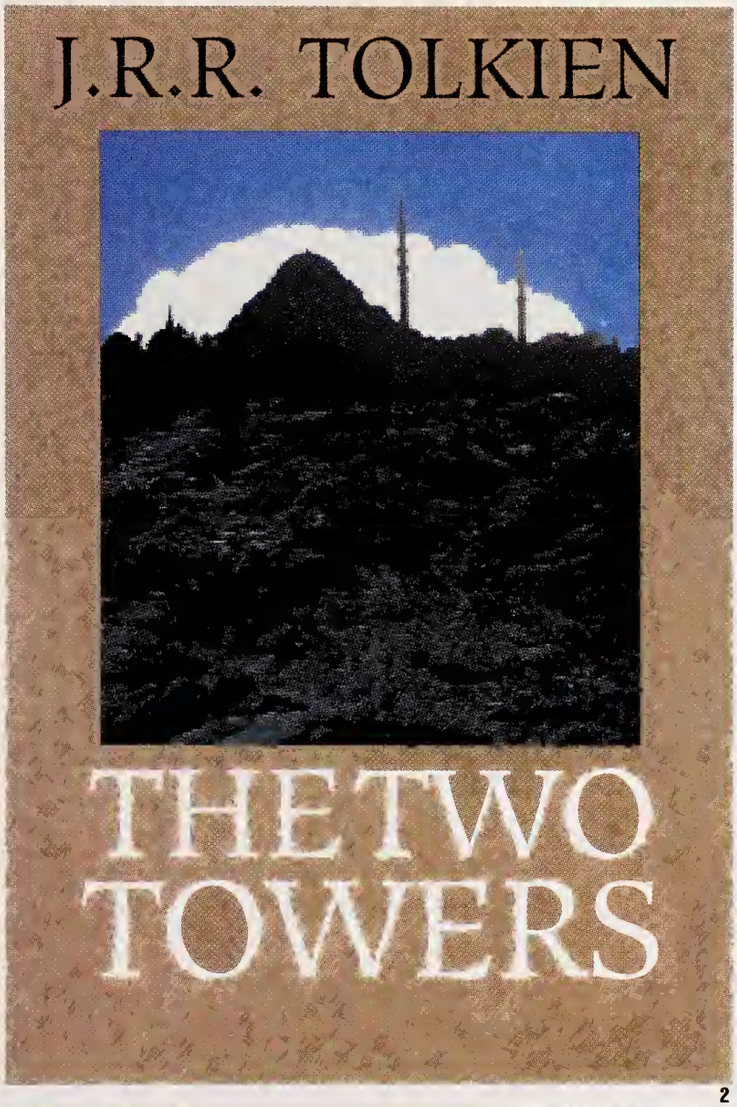
PhotoMac comes with a handy auto-selection tool that recognizes edges. To the best of my knowledge, it is a unique feature of the program. But like any automatic computer interface, such as optical character recognition or autotracing, its behavior is somewhat unpredictable. I rather enjoyed the surrealistic accidents that resulted from layering one automatically selected object on top of another and weaving them into a montage. Trying to get a specific desired result, however, could be frustrating and only marginally less tedious than using Exacto knives and a waxer. If the area selected is too large or too complex, the program will either abort the process or select only a part of the object.

Another nice trick of PhotoMac is adding color to black-and-white scanned images. Any area can be isolated and its color balance modified. The effect resembles the old-fashioned technique of hand-coloring postcards before the days of color photography.

Much as I have enjoyed experimenting with PhotoMac, I am left with some uncertainty about the exact quality of the printed images produced on the offset press. Whether successful or not, these images tell us a great deal about how far we have come in just a few short years of digital publishing.



1 Taking advantage of the flipping and flopping functions of PhotoMac to create a kaleidoscopic montage of natural and computer-generated images, I became intrigued by the possibilities of overlapping negative-to-positive transformations. Scanner: BarneyScan. TIFF format, 1200k.



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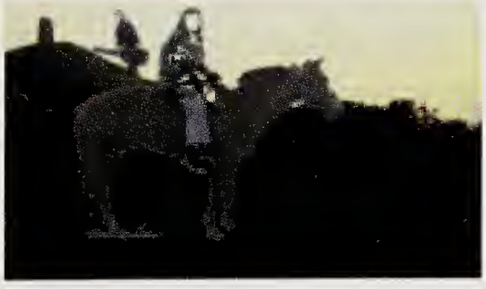

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2 Combining a slide of the dark Vishnu schist rock formation from the bottom of the Grand Canyon with the skyline of Istanbul suggests the forbidding fantasy land of Mordor. The seam between the two images was blended to soften the transition and the edge of the picture was also softened. The number of minarets was reduced to conform to the title by using the brush tool.
3 A faceless rider resulted from the use of PhotoMac's unique auto-selection tool after extracting the equestrian image from pictures of the California coast and placing over the hills of Glastonbury. Scanner: BarneyScan. TIFF format 1800k (rocks), 1100k (horse).

4

4,5,6 PICT files are also editable in PhotoMac. Although they cannot be printed as true halftones, they can be separated through PixelPaint. The automatic selection tool was able to discern the edges of the foliage around the tower (5), but balked at Bryce Canyon (4), where the lasso tool had to be employed. Attempts to use the airbrush tool yielded predictably messy results (6). Scanner: SharpScanner 150 dpi PICT format.

5

6

IMAGINE TOKYO '89
An Evolving International Exhibit of Personal Computer Art
September 11–22 at the Sogetsu Kaikan Gallery
September 23–October 11 at the Konica Gallery
Produced by Michael Gosney and the Verbum Journal
Japanese host and co-producer—Holonet, Inc., Mr. Izuru Satsuki

1

Imagine TOKYO 89

Previous versions of IMAGINE have been exhibited in Newport Beach, California (March 1988, at the Newporter Resort in conjunction with Apple Computer, Inc., Imaging Sciences Offsite), Boston, Massachusetts (September–October 1988, at the Computer Museum), and San Diego (July–August 1989, United States International University). Selections from the show have been exhibited at Verbum's "Digital Art Be-in" at Amercian Zephyr Studios in San Francisco in January 1989, and at "The Future" conference on electronic art and design in Toronto in March 1989, sponsored by the Canadian Society of Graphic Designers.

IMAGINE TOKYO '89 was a completely new version of the show, with a few works from the early exhibits, but primarily new works—about 50—from Japanese artists and roughly 100 from U.S., European, and Australian pc artists. It also included multimedia works using personal computer systems and presentation equipment, which were shown during the exhibit. The general theme followed in the selection of works was "nature and ecology." Works were chosen for originality, quality, effective use of pc tools, and content.

The Sogetsu Kaikan Gallery is part of the Sogetsu school, Japan's leading avant garde school of ikebana (flower arranging). The Konica Gallery, located in a very busy section of Tokyo, had about 600 visitors a day. The opening event was well-attended and the exhibit was covered in leading Japanese pc and desktop publishing magazines. It was also featured in national consumer magazines and a national television show.

The mission of the IMAGINE exhibit is to inspire creative use of the new electronic art tools, showcase stimulating art content, and promote international cooperation in the arts. Various Japanese sponsors, including Apple Computer Japan and Shinku-Denki, made IMAGINE TOKYO '89 possible. Sponsors of previous shows include Apple Computer, Inc.; Letraset U.S.A.; Silicon Beach Software; and SuperMac Technology. Currently, *Verbum* is exploring exhibits in several countries in 1990, including Australia, Hong Kong, and, again, Tokyo.

Featured here are a few of the works from IMAGINE TOKYO '89, primarily from Japanese artists.

OPENING REMARKS
Michael Gosney

Thank you for joining us today. I am very happy to be a part of this event, which is the result of the hard work of many people.

I would like to thank Mr. Satsuki and Ms. Aikawa of Holonet, as well as their dedicated staff and associates for all the positive energy they have put into IMAGINE TOKYO '89. I would also like to thank our sponsors and galleries for supporting this exhibit. We feel it is the start of something quite significant.

Pc art, or perhaps a better phrase is pc-assisted art, is an exciting new genre, quite distinct from what has previously been known as computer art. Relatively inexpensive and very powerful pc systems have given a wide range of talented people access to exciting new art tools. We hope that the IMAGINE exhibit will help to stimulate use of these tools in commercial graphics and fine art. We want to encourage artists to use these tools effectively. But although technical innovation and craftsmanship are always important in art, we are most interested in inspiring meaningful subject matter. I personally believe that artists have a responsibility to express society's hopes and dreams, to hold a mirror up for society to see itself, and to help stimulate positive growth and change. IMAGINE TOKYO '89 has a theme of nature and ecology, which is particularly significant in these times, and a stimulating subject for artwork generated with high technology. We are proud of the artists who have contributed to the exhibit with quality work and thought-provoking content.

IMAGINE TOKYO '89 is the beginning of a truly international, ongoing art exhibit which will promote exchange and synergy between cultures.

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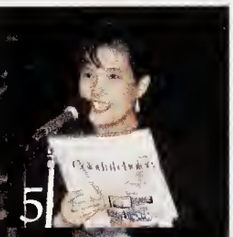

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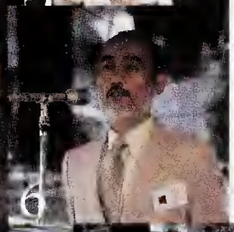

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1 Sogetsu Kaikan
2 Konica Gallery lobby
3 Konica Gallery first floor
4 Konica Gallery second floor
5 Madoka Aikawa, Holonet
6 Izuru Satsuki, Holonet
7 Kuro Takahashi of Holonet, with Barbara Thurlow (bowing) and Jack Davis of *Verbum*, and Holonet staff members Keiko Sasau and Shoko Kichise.
8 Michael Gosney of *Verbum*
9 Opening attendees

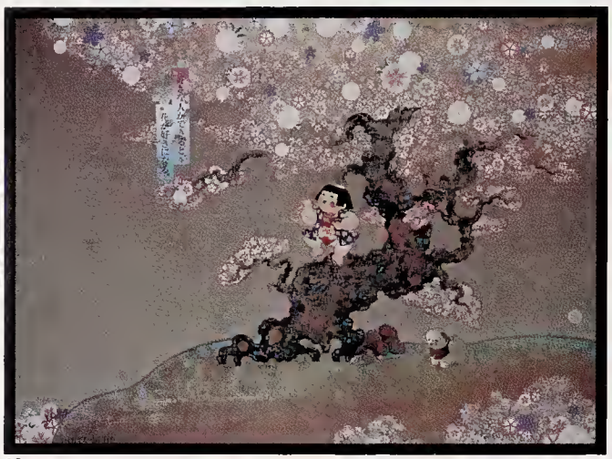
Pages 14-17 were produced with the Visionary/Scitex system at Widen Colourgraphics Ltd, Madison, Wisconsin. The typography and page geometry were executed in Aldus PageMaker Color Extension and converted to Visionary format with the V.I.P. interface. 619-457-2431

10 ***Obara School Poster***
Yukimasa Okumura
This poster for a leading school of Ikebana in Japan was a collaboration of several artists: art direction, design, and Japanese painting illustration by Mr. Okumura; 3D golden flowers by Hajime Tachibana using Super 3D on the Mac; other flowers by Mitsunobu Murakami using Illustrator '88; copy by Yoichi Umemoto. The tree illustration was separated traditionally while the pc-generated pieces were separated on a Linotronic 300 and stripped in for the final offset printing. (Separated here from a photograph of the poster.)

11 ***Mother Universe***
Jun-Ichi Matsuda
Created with Studio 8 on a Mac II using images scanned with an Epson GT-4000 with the Color Magician II scanner driver software. Output on a Canon FP-510SPA inkjet printer. (Reproduced here from a photograph of the framed print.)

12,13 ***Opera Arias #1 and #2***
Akihiko Matsumoto and Azuma Kawaguchi
The photographer and pc artist of these pieces planned the photos together and collaborated throughout the entire process of image manipulation. Mr. Matsumoto photographed model Joanna with the help of stylist Ms. Tomoko Masuda, and Genju on hair and make up. PC artist Mr. Azuma Kawaguchi used an NEC PC-9801RA2 system (the 9801 series is MS-DOS based, but not an IBM pc clone) to modify the digitized photos with the Sapience Super Tableau program. The 4"x5" transparencies used here were produced digitally by Fuji Color Service Company's CG Hard Copy Service Center in Tokyo.

14 ***Mind's Eye***
Kolyana Mamaco
Painted with Dyna Pix V on an NEC PC-9801XL, and output on a Sharp IO-725 inkjet printer. (Separated here from a photograph of the framed print.)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'88 TOKYO Imagine

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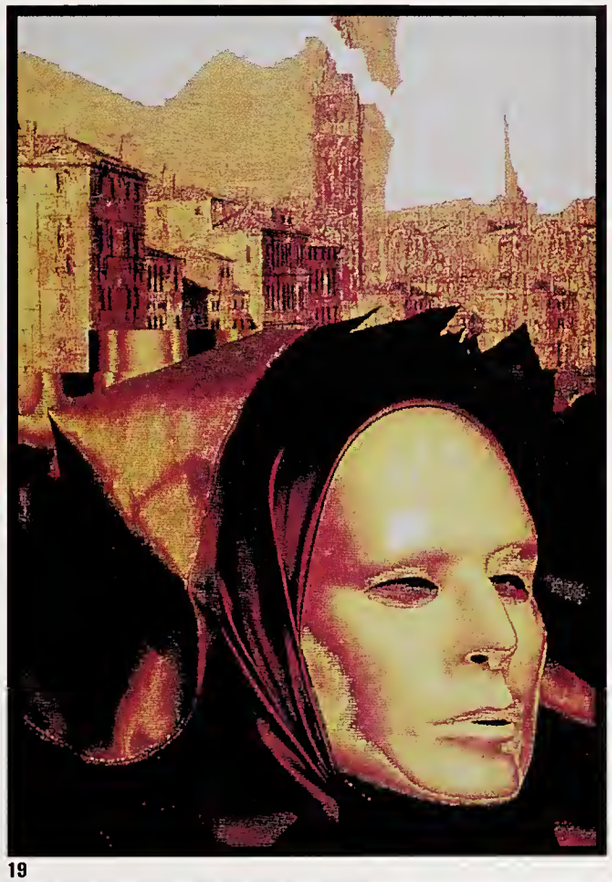

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15 ***Rural Scenery***
Makoto Hideshima
Painted with Dyna Pix V on an NEC PC-9801XL. Reproduced from a photograph of the monitor. (Reproduced here from a photograph of the framed print.)

16 ***Momentum (December)***
Takenobu Igarashi
This striking oversized calendar used innovative 3D numerals developed on a Macintosh Plus with Pro 30 from Enabling Technologies. The bitmap figures were executed in final form with clean edged overlay material, then printed offset. (Reproduced here from a photograph of the mounted calendar page.)

17 ***Imagine Tokyo Poster #1***
Hiroshi Teshigahara
This poster is one of several "PC Printworks" posters developed for IMAGINE TOKYO '89 by Holonet's Izuru Satsuki working with well-known Japanese artists who had never worked on pc's. The calligraphic image was executed by Hiroshi Teshigahara, and enhanced, under his direction, by Mr. Satsuki using PixelPaint and Studio 8 on the Mac II. The Imagine Tokyo logo was brushed by Koshi Ogawa and converted to the Mac by Mr. Satsuki using Streamline and Illustrator 88. The poster was produced in Quark Xpress and separated on a Linotronic 300. It was printed offset (reproduced here from the actual poster).

18 ***Our Little Home***
Sandra Filippucci
Developed by New York City artist Filippucci on the Amiga 1000 with PhotonPaint. Printed on a Xerox 4020 printer with slight hand rendering. (Reproduced here from a photograph of the framed print.)

19 ***Metamasque #1***
Dominique de Bardonneche Berglund
Swiss artist Berglund, seen previously in *Verbum*, used a Sharp 450JX flatbed scanner and PixelPaint to execute the Metamasque series. Each 11" x 17" print was output on a QMS ColorScript printer. (Reproduced here from a photograph of the framed print.)

20 ***Pride***
Michael Scaramozzino
Developed with Tech Graphics II on an IBM-PC, this piece was imaged on a film recorder and enlarged as a Cibachrome print. (Reproduced here from a photograph of the framed print.)

Getting digital fine art off the screen and onto the wall

PIXELS AT AN EXHIBITION

New York artist Barbara Nessim sums up what many artists working with computers feel. "We're searching," she says. "Every artist working in this new medium is searching for a way to express himself or herself. "

The new medium is electronic art generated with the use of a computer. And while some optimists say that the computer is just another advance in the progression of art tools, much like moving from egg tempera to oil, the fact is that many denizens of the arts, including galleries, critics, and museums, think computer works are a funky addition to the technopop culture we live in. One important step in confronting and overcoming that prejudice is to present the art in an archival form acceptable to collectors and galleries. Whatever surface materials an artist chooses to use, there's one hard and fast rule: They've got to last.

Off the Screen, Onto Tiles

There seem to be as many methods for outputting art from a computer system as there are artists. Some artists, hindered by hardware or software limitations, produce individual tiles—separate sheets of imaged paper, usually 81/2 x 11 inches—that are later pasted together. Some prefer silk-screening. Some produce transparencies with a digital film recorder. These are later made into Cibachrome prints, a photo print with dies encased in polyester to retard fading, considered the only acceptable archival print form in the world of fine art photography.

Marius Johnston, an artist working in the San Francisco Bay area, has chosen to use the tile method to transform his images from screen to collectable art. Johnston recently acquired a Macintosh IIcx, which he says is "radically different" from his old Macintosh Plus.

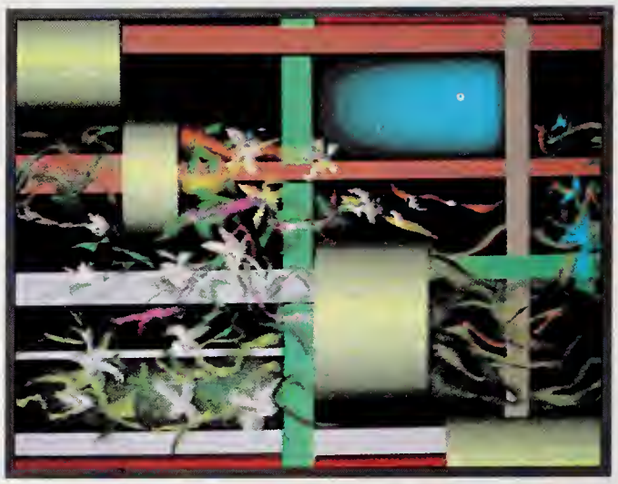
On his large color screen, Johnston divides his image into panels. The computer allows him to see the panels put together as a unit, or he can zoom in on one panel. The panels are designed to be printed separately, as 8 1/2 x 11-inch sheets.

When he has finished a new piece, he prints to his 1200-line Hewlett Packard PaintJet color printer. But that machine has a serious drawback: its inks fade rapidly. Johnston's next step, then, is to cart his work to a copying center that offers a Canon color copier. He brings along 100-percent acid-free rag paper and copies his tiles onto that archival material. Although the colors used by the copier have not yet been proven to be fully archival, Johnston has faith that they will be virtually free from fading. In any case, he argues, the colors are much more permanent after the copying process than they are when his tiles come out of his printer.

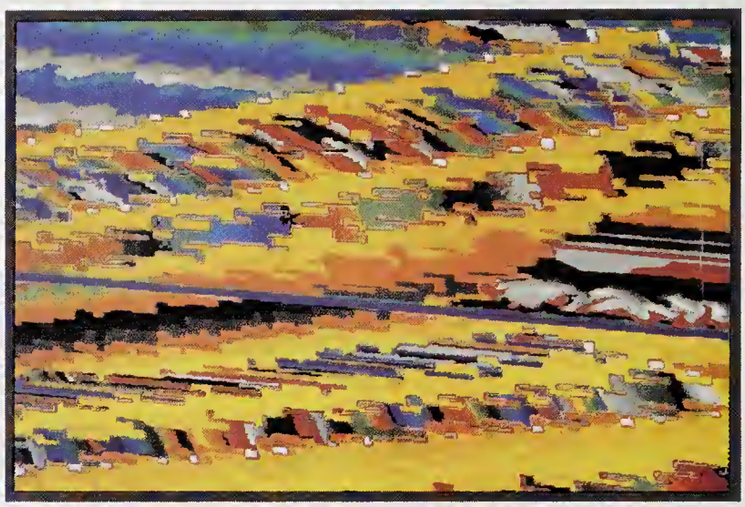
After copying, Johnston assembles the tiles. He often uses hollow core doors picked up from construction sites or home supply centers as his mounting surface. The doors offer wood veneers and a very solid backing.

Johnston experimented with a variety of adhesives before turning to the most obvious selection, wallpaper paste. The paste is a natural insect-resistant product that won't affect the paper and won't cause wrinkles when the tiles are mounted. The back of each tile is covered with the paste and applied to the door. Getting a good fit is often difficult.

"It's tedious beyond belief," said Johnston. "Picture in your mind a nine-panel painting composed of three rows of three panels stacked on top of each other. What you do is join the top three as carefully as you can, lining up as you go across. I made a cutter out of a metal yardstick, and it makes a cut like a guillotine. I either butt the edges or slightly overlap them. The pixels are large enough so minor variations don't matter."



Organic Conquest of Geometric Space
Lawrence Payne
Digipaint on Amiga 1000
Monoprint, Cibachrome



Westbound Train
Brentano Haleen
PixelPaint on Macintosh II
Lithograph

Nessim has also used the tile process and wallpaper paste for some of her works, but she often applies her colors by hand rather than by using a color printer or copier. She attributes some of her success to this combination of electronically generated images and handwork which, she says, melds the traditional arts methods with the digital medium.

Nessim works either with an Amiga using a Polaroid palette or with a Macintosh. She often uses a laser printer to output in black and white and then applies pastels or water colors by hand. Like Johnston, Nessim finds the toners and inks in color printers unreliable and won't commit her work to the output from these machines.

"My criterion is archival quality. It has to be archival and that's one reason I don't use color printers," she explains.

Nessim stresses the research an artist should do before committing works to hard materials. She buys pH neutral 100-percent rag paper that she trims herself to fit her tile size and printer limitations. Even the paste she uses to apply the tiles to boards comes from a company specializing in archival materials.

■ *by Brian Alexander*

Memento Mori/Manchild **Marius Johnston SuperPaint on Macintosh Plus Tiled Imagewriter prints on cotton paper**

Large-Format Output

While tiling, for instance, may be appropriate to achieve the effect the artist desires for a particular image, another image may be wrecked by outputting on tiled pieces of paper when it should be silk-screened onto canvas instead. According to Nessim, research and experimentation can allow an artist to enhance an already good image by applying it to the proper surface.

Michael Johnson of Orange County, California, is still searching for how best to execute final versions of his art. Johnson saves his images to slides using a Matrix film recorder that produces a 2000-line slide or a 4000-line 4 x 5-inch image. Johnson uses these slides strictly for marketing his work.

"I don't like the surface of film," says Johnson. "I've hunted around to see how to get large images output commercially." One avenue he has explored is printers used to create billboard art with computer-driven ink jets.

Johnson has used Computer Image Systems of Torrance, California, a primary supplier of billboard printing services. According to Bill Ishida of Computer Image Systems, in his company's process slides or photos are first digitized, and any modifications such as retouching are performed. (The system also accepts TARGA files directly.) Then the image is saved to a file, which is transferred to a host computer. The host converts the new digital file into signals which, in turn, control airbrush guns that spray directly onto substrates like canvas or paper. Ishida claims one of the only limitations to the material used is that it has to be flexible enough to wrap around rotating drums. The company can produce output of almost any size, preferably over a minimum of 6 x 8 feet.

Johnson has also used Jetgraphix in Los Angeles for this kind of digital ink-jet printing. The company prints on archival material from 24 x 30 inches to 30 x 42 inches and works mostly with fine artists. Gamma One in New Haven, Connecticut, also provides high-resolution, fine art ink-jet printing up to a 24 x 24-inch size.

Although large-format commercial output can solve some problems, it has two major drawbacks. The first is cost. Such services can run as high as $2000 per copy for large pieces. The per-piece price of smaller works is substantially lower, though, especially when multiples are run.

The second drawback is that the archival quality of the inks used has not been proven. Archival papers or canvas can be supplied by the artist or publisher, but the inks come from the printer. Ishida says the inks his company uses are guaranteed for one year of outdoor use, and tests have shown negligible fading after two years, but the company has not run tests that could prove the durability of the inks in the archival sense.

Artist Brentano Haleen of San Diego also has used Computer Image Systems services with good results. He supplied 6 x 9 foot canvases and 4 x 5 inch transparencies of his works. One problem Haleen found he had to plan for was loss of resolution when the ink was sprayed onto the surface.

Lithography

Haleen also makes limited-edition lithographs of his work from transparencies made with a Matrix film recorder. The slide is scanned with a laser color separator, and traditional lithographic plates are made from the scanned image. The cost is high, says Haleen, but all these steps are necessary to produce archival material.

With lithography, the inks are reliable and the paper can be supplied by the artist or the company publishing the artist's work. And, according to Haleen, there's one other advantage to using a good litho house to print images—the connection between many lithographic printers and museums, galleries, and art publishers. Haleen has had works scooped off the litho press because the printer called in a buyer to have a look.

"To date, my best links to the fine art world are these lithographs," said Haleen. "They're in a medium that is acceptable to collectors."

Silk Screen

Texas artist Mel Ristau uses silk-screen prints almost exclusively. After creating his image with a Macintosh IIcx and Illustrator or FreeHand software, Ristau takes screen shots or places his image in a Studio 8 file and colors it there. He uses a service to output these images onto slides for viewing by galleries and collectors.

If Ristau gets positive feedback from circulating his slides, he makes a limited-edition silk-screen printing, usually measuring 30 inches square. First he outputs to a Linotronic or a black-and-white laser printer. Then he puts this image onto high-contrast photographic film. This film base is used to expose an emulsion-coated, water-soluble stencil in a contact frame. The stencil is applied to a screen. The silk is dried and the back of the stencil peeled away. The stenciled areas are then ink-receptive. Once the first screening is finished, Ristow can save and reuse the screens.

Film

Another New York artist, Roz Dimon, prefers to transfer her images to Ektachrome slides. Although the process is a secret, Dimon's husband and manager, James Dawson, says that no electronics are used in producing the slides.

According to Dawson, after the slides are shot, they are processed at a private developing studio. An internegative is made

from the slide, and a large CibaMural of about 5 x 6 feet is created. The print is laminated and mounted on a black matte wooden museum box for display.

Dimon has already made something of a splash in the corporate art world. For example, some of her works have been purchased by AT&T for its supercomputer center, which is ironic because Dimon does most of her work on an Amiga, one of the least expensive micros.

Increasing Acceptance

Besides overcoming prejudices held in the larger art world against computer art, producing archival works helps settle some important questions in the minds of the pc artists themselves. "I don't know that it's at the level of high art yet," theorizes Marius Johnston. Still, he sees a hopeful future for pc art in the minds of galleries and collectors if some fears can be assuaged.

"I think that if I were a gallery owner, I would be concerned that people could make multiples, thereby diluting the original. That's something the individual artists are going to have to address. What will the market bear?"

Indeed, most artists are acutely aware of the hesitation collectors and galleries feel toward a piece that exists electronically and can be reproduced exactly, or subtly altered and submitted as new material.

"The fear on the part of collectors," suggests Oregon pc artist Lawrence Payne, "is that the image can be tweaked—how do they know they won't see it in a hundred other places? But it's the same with photographers and print makers. You have to trust the artist."

One collector willing to take the risks involved with a new, reproducible medium is Chicago attorney Mitchell Melamed. Melamed became interested in computer art when he and his wife wandered into a computer art show while on a collecting trip for other works of contemporary art. He purchased a piece of sculpture designed on a computer. He also saw Nessim's work and contacted her about a possible purchase.

Melamed is aware of the inherent risks involved in collecting computer art, but feels the medium is up and coming and so worth the gamble. As a representative of a group of collectors who purchase the works of artists such as Miro, Melamed says he would not advise his investors to go after computer art yet because the form has not developed enough to warrant such serious attention. But on a personal level, he finds the works, and his budding collection, worthwhile.

"I'm taking it seriously," he says. "I have a financial commitment. I'm not sure the art world will take it seriously yet. I'm not sure the exposure has been well enough defined. The computer art world itself has not made a significant move to have its art exposed as real art."

But, like the collectors of early pop art, Melamed thinks he may be onto something and that other, mainly younger, collectors feel the same way.
"This is an area in which younger collectors can be involved because the price structure is not as high as in other art mediums," he says. In other words, some buyers are getting while the getting's good.

Some art critics feel differently, insisting that art created on computers is, at best, graphically interesting but without lasting importance in the world of art. Nessim, an artist for 30 years, chafes at that suggestion.

"That is a typical prejudice," she sighs. But she cites the recent acceptance of her work at the Kuntz Museum in Dusseldorf as evidence that computer art is being taken seriously, at least by the avant-garde of the art world.

Book Memory (Memory Swirls)
Barbara Nessim
MacPaint on Macintosh Plus with watercolor
Tiled laser prints on cotton paper

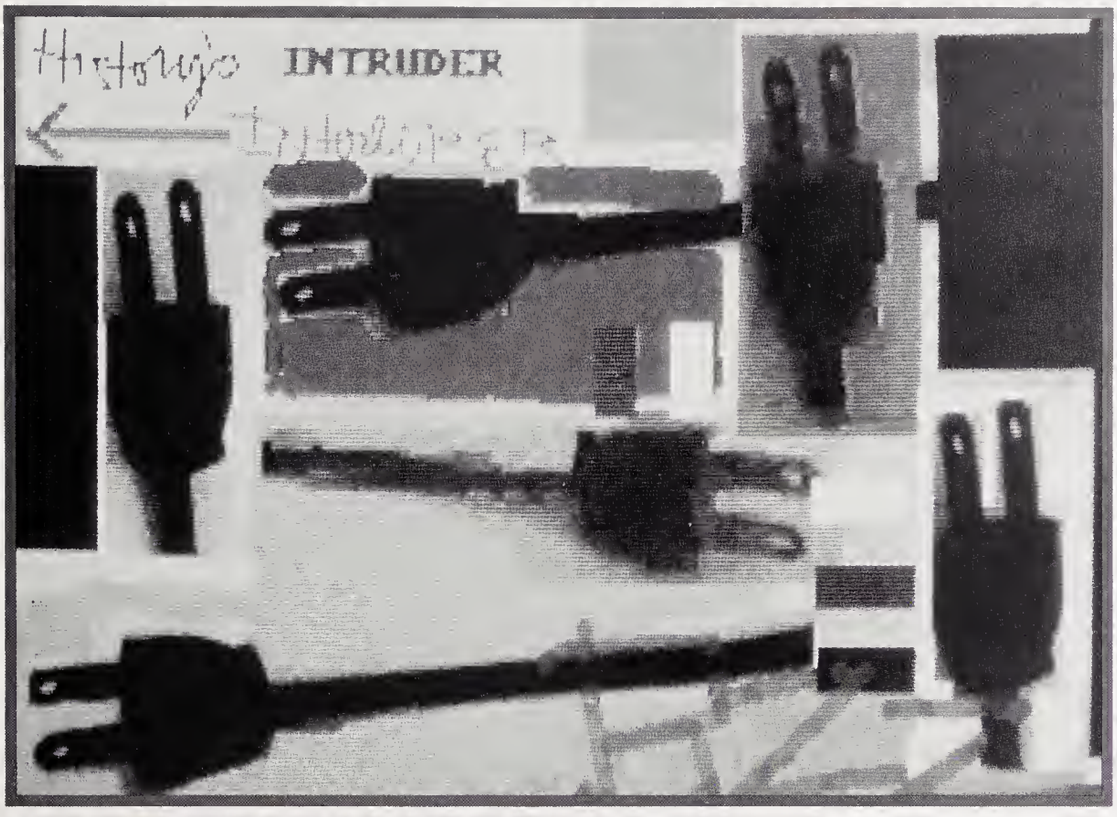
Jupiter Startles Leda
Michael Johnson
TIPS and Rio/ Riopics on Targa 16 MS-DOS system
Monoprint
Cibachrome

"Computer art is here, period," insists Nessim. "People who do not recognize it are in a backward state."

Daria Barclay, owner of the Abaci Gallery in Portland, Oregon, hopes more and more people will recognize the validity of computer art. "There are a lot of computer-art collectors and buyers supporting the computer-art movement," she says.

Barclay agrees with Melamed that part of the appeal is the newness of the medium. "How often do you get in on the leading edge of a whole new art medium?" she asks.

But being in on the beginning is not enough for the collectors Barclay sells to. Buyers want to know how tight the resolution of the piece is, how the work was achieved, what type of paper or other surface is being used to present the image, and what the



History's Interloper: Intruder
Roz Dimon
DeluxePaint II on Amiga 1000 with Digiview Monoprint, Cibachrome

A Nightmare
Mel Ristau
Adobe Illustrator on Macintosh Plus
Serigraph

reputation of the artist is like. For instance, if an artist is already established in oil painting, there is a greater likelihood that his or her computer work will spark interest.

For example, the work of one renowned artist, David Hockney, may be doing more than the combined efforts of all working pc artists. Hockney, who pioneered the use of tiled Polaroid photographs, has recently mounted an exhibit of art created with a FAX machine. In November, he sent individual tiles that comprise an image of a tennis game to an English gallery via a two-hour FAX transmission. Right or wrong, such a high-tech work by a major contemporary artist will help gain acceptance for artists like Nessim, Dimon, and others.

According to Barclay, collectors also look for consistency in an artist over time. It doesn't do an artist much good to knock off a few varied pieces with no discernible style. Artists need to have a vision, and, says Barclay, that's what will eventually separate the true pc artists form the computer tinkerers.

One step in that direction, say some artists, would be less reliance on scanned images. When an image relies on digital manipulation of a piece of found art, they argue, the final work is more of a "gee-whiz" technical ploy than a product of true creativity. Artists who use scanned images frequently counter that scanning and manipulation is one way that the computer medium is unlike any other art form. They say scanning is integral to pc art's uniqueness.

Mitchell Melamed has another idea besides vision and the use of archival materials for getting computer art into the mainstream of the art world. He thinks a little old- fashioned public relations could push computer art into the limelight and force more recognition for its achievements.

"If someone bright—perhaps the computer art group, if such a thing got together—really made a move and had a spokesperson or hired someone to get exposure, I think it would make a significant difference at this point."

Looking Ahead

But whether or not artists master the craft of archival reproductions, regardless of their inner vision and commitment to the new medium, and despite its growing commercial success, computer art is still a controversial mode of expression, and artists are just going to have to live with the doubts of others for a while longer.

"Attitudes have changed incredibly in five years," admits Haleen. "I used to be laughed at and ridiculed and not taken seriously. I doubted myself and what I was doing. Now they say, `That's exciting. Let's see some more of that.' Of course, my wife still says, `Why don't you be a real artist and paint?'"

Brian Alexander is a free-lance journalist residing in San Diego.

For information on large output formats, contact:

Computer Image Systems
20030 Normandie Avenue
Torrance, CA 90502
1-800-736-5105

Jetgraphix
1531 Pontus Avenue, Suite 300
Los Angeles, CA 90025
213-479-4994

Gamma One
12 Corporate Drive
North Haven, CT 06473
203-234-0440

NEW FRONTIER PRODUCTS

■ *by Mike Kelly*

BUSINESS

Artcare (for the Mac)
A software system for managing art galleries. Records and coordinates gallery activities such as inventory, sales, disbursements, client lists, and catalogs. $1250. ArtCare, 740 West End Ave., New York, NY 10025, 212-222-7381.

CAD/CAM

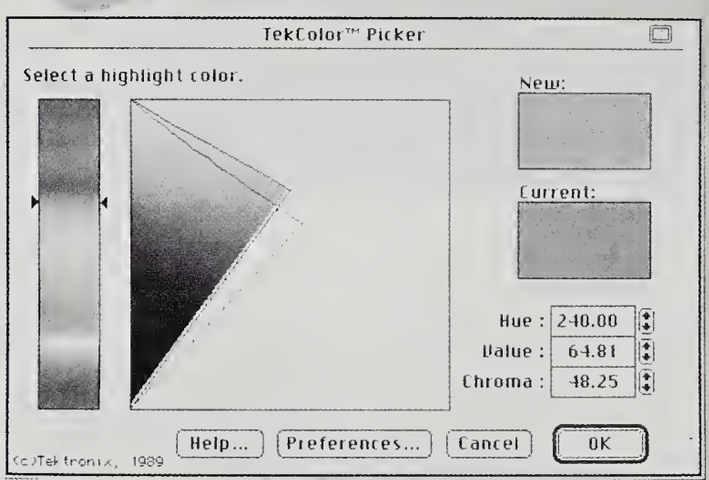
MacConcept 3.0
(for the Mac)
Computer Aided Design 3D software that interfaces with ClarisCAD, a 2D design and drafting tool. Allows you to design in 3D and convert to 2D for output. Features real-time dynamic rotation and perspective, up to 32 frames of animation in three modes: swing, zoom, or walk. Allows illustrations to be exported to other Mac programs. $1995. Current ClarisCAD owners may buy at $1495. Klex Software, Inc., 25633 Branchaster, Farmington Hills, MI 48018, 313-477-6800.

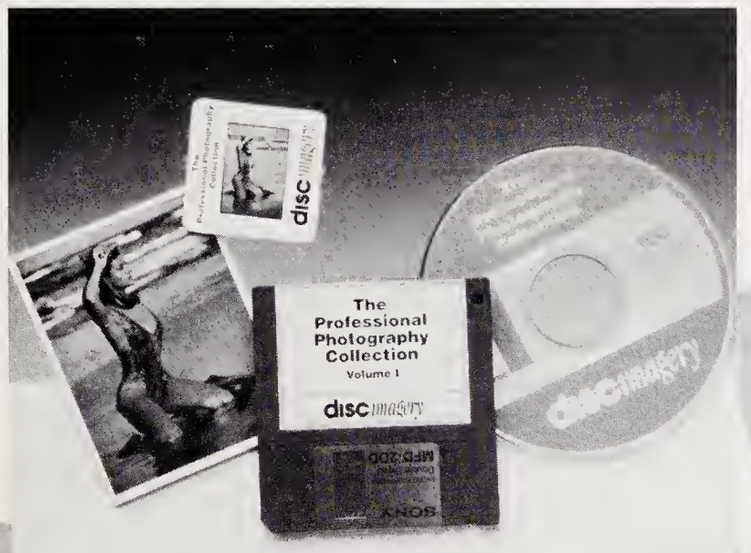
COLOR CALIBRATION

Calibrator *(for IBM, Mac)*
This display monitor, keypad, and optical sensor system offers yet another solution to the problem of color fidelity. Microprocessor-controlled display allows control over all visual parameters for high-resolution application situations, including medical imaging, instrumentation, prepress, mapping, and more. Operates as a stand-alone or allows pc or Mac to substitute for keypad. Calibrator monitor, $6700. Keypad, $750. Optical sensor, $980. Barco Industries, 170 Knowles Dr., Suite 212, Los Gatos, CA 95030, 408-370-3721.

PrecisionColor Calibrator *(for the Mac)*
A fiber-optical sensing device and software that works with the Radius Color Display System to calibrate the monitor to match Pantone colors in about three minutes. Settings include color temperature and gamma correction. $695. Radius, 1710 Fortune Dr., San Jose, CA 95131, 408-434-1010.

TekColor *(for the Mac)*
Color fidelity system permits color matching between your screen and any output device. Installed in the system folder, this software includes device data bases for the leading Macintosh monitors. Activated through the control panel, the interface screen allows users to select a "hue leaf" from a range of shades within a color set to match a given output device. TekColor is already being incorporated by Aldus, Radius, E-Machines, and RasterOps. $50. Tektronix, Inc., Wilsonville Industrial Park, P.O.B. 1000, Wilsonville, OR 97070, 800-835-6100.





CLIP ART

Professional Photography Collection (for the IBM, Mac)
Finally, color stock photos as clip art on disk or CD-ROM. Unlimited reproduction rights, including scanning and manipulating. Volume I: Business, Scenics, Women, U.S. Cities, Food, Health, Fitness. More volumes every four to six months. Price depends on format. For example, 24-bit-color TIFF and 8 bit B&W TIFF files on CD-ROM, $149. Discimagery, 18 East 16th St., New York, NY 10003, 212-675-8500.

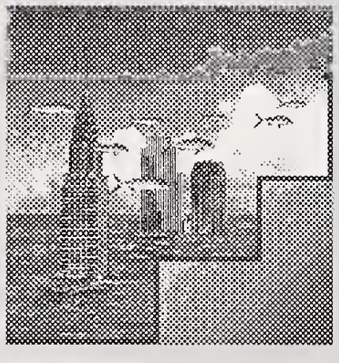
COLOR IMAGE EDITORS

Adobe Photoshop (for the Mac)
Adobe has built a wide range of image enhancement tools into this product acquired from Knoll Software. A toolbox of paint and draw tools, combined with a range of filters and numerous image-altering tools, allow photos, slides, or electronic art to be manipulated. Works with files of up to 300 Mbytes by using the virtual memory technique, i.e., requires lots of hard disk memory. Prints CMYK separations directly or can output Encapsulated PostScript documents. Can be imported into page make-up programs or into Adobe Illustrator for type and line-art effects. Allows for conversion of images into different file formats. $895. Adobe Systems Inc., 1585 Charleston Rd., P.O.B. 7900, Mountain View, CA 94039-7900, 415-961-4400.

Aldus PrePrint (for the Mac)
Designed to work with files from PageMaker Color Extension and other applications that conform to the Open Prepress Interface (OPI) and Adobe color conventions. Allows users to improve color and gray-scale TIFF images, to make color adjustments to accommodate the particular press to be used for printing, and to produce color separations of TIFF files or the entire document, including text, illustrations, and images. PrePrint replaces Separator, the separator planned for PageMaker Color Extension, and will ship in the second quarter of 1990. $495. Aldus Corporation, 411 First Ave. South, Seattle, WA 98104, 206-628-6594.

PhotoMac (for the Mac)
Manipulates photographic images in 24-bit color, outputs proofs and separations. Allows standard 8-bit Mac II display to be used to work with 24-bit color. Exports to PageMaker, Ready-Set-Go, and QuarkXPress 2.12 and allows final layout separation of all three. Also supports Illustrator 88, FreeHand, PixelPaint, and other graphics programs, as well as a wide range of scanners, slide makers, and high-resolution film recorders. $795. To registered PhotoMac 1.0 owners, $90. Avalon Development Group, 1000 Massachusetts Ave., Cambridge, MA 02138-5304, 617-661-1405.

UltraPaint *(for the Mac)*
The makers of Canvas now bring you what they call the ultimate b & w painting, color painting, object drawing, and gray-scale editing program. Features include eight layers, 600 dpi precision, rotation in one- degree increments, customized color palettes, programmable airbrush, advanced masking, blended fills, and support for up to 256 colors. $199. Deneba, 3305 N.W. 74th Ave., Miami, FL 33122, 305-594-6965.



FILM RECORDERS

FilmPrinterPlus
(for IBM, Mac)
This new film recorder works with both IBM and Mac computers to make slides. Joins the earlier FilmPrinter slide film recorder for the Macintosh. Supports PowerPoint, Persuasion, Micrografx Designer, Zenographics Pixie, Harvard Graphics, Lotus 1-2-3, Freelance Plus, and others. Does not support PostScript output. FilmPrinter Plus and software driver, $6390. FilmPrinter, $4995 (includes software drivers). Mirus, 4301 Great America Parkway, Santa Clara, CA 95054, 408-980-9770.

FONTS

ATM (Adobe Type Manager)
(for the Mac)
Displays type in the maximum resolution of the Mac's screen no matter how odd or how large the font. Uses maximum resolution of target printer, even if it is a non-PostScript printer. However, ATM works only with Adobe fonts. $99. Adobe Systems Inc., 1585 Charleston Rd., Mountain View, CA 94039, 415-961-4400.

GRAPHICS HARDWARE

Graphics Accelerator (for the Mac)
Plugs directly onto SuperMac's ColorCard/24™ display card. Allows you to manipulate 24-bit color images up to 20 times faster than QuickDraw. $499. SuperMac Technology, 485 Potrero Ave., Sunnyvale, CA 94086, 408-245-2202.

MacVAC (for the Mac)
This is a video animation controller that can provide frame-accurate output to various professional recorders. Works with Truevision's NuVista 32-bit color video board and VIDI/O encoder to output as many as eight 24-bit color frames at a time. $3000. Digital Imaging, 22 Rocky Knoll, Irvine, CA 92715.

Radius QuickColor
(for the Mac II)
Graphics accelerator for the Mac II that executes graphics on a 6 MIPS RISC processor at up to six times the speed of a standard color board by bypassing the Mac II main processor. $895. Radius, 404 E. Plumeria Dr., San Jose, CA 95134, 408-434-1010.

RasterOps SFX (for the Mac II)
An add-on option board for RasterOps ColorBoard 232 and 224. Allows you to mix computer-generated graphics with live TV, VCR, or S-Video signals and to display results on TV or videotape. $1495. RasterOps, 2500 Walsh Ave., Santa Clara, CA 95051, 408-562-4065.

PosterWorks
(for the Mac)
Prints large posters (up to 100 square feet) on any b&w or color PostScript printer using the "tile" technique. Output options include halftones, color prints, and color separations. Software is included that enables you to calibrate the colors for a specific output device. (That feature alone makes it worth the price.) Supports 24-bit images created on the Macintosh, as well as 32-bit images imported from high-end Scitex, Crosfield, and Hell scanning equipment. $167. S. H. Pierce & Co., Suite 323, Building 600, 1 Kendall Square, Cambridge, MA 02139, 617-395-8350.

Super Digitizer Tablet
(for the Mac)
Uses a pressure-sensitive stylus to vary line width, airbrush density, and color gradation. Several models are available starting with a 12" by 12" size. Prices begin at $895. Special stylus is $125 extra. Wacom, West 115 Century Rd., Paramus, NJ 07652, 201-265-4226.

GRAPHICS UTILITIES

Exposure (for the Mac)
This is a color-screen dumping utility that lets you select all or part of the screen and save it as either a PICT, PAINT, StartupScreen, or Scrapbook format. Includes a tool that allows you to erase, alter, or label parts of screen before taking a snapshot. $99.95. Preferred Publishers, Inc., 5100 Poplar Ave., No. 706, Memphis, TN 38137, 800-446-3383.

PICTure This (for the Amiga, IBM, Mac, Sun, et al.)
Converts 16 different graphic file formats used by IBM, Macintosh, Sun, Amiga, and others. MS-DOS formats supported include Targa-16, CGM, Dr. Halo CUT, Gem IMG, Lotus PIC, and PCX. Macintosh formats include PICT2, TIFF, RIFF, EPS, and MacPaint. Other formats include Sun Raster files, IFF and RIFF from Amiga, GIF and RLE from CompuServe, X11 bitmaps. $99. FGM Inc.,131 Elden St., Suite 108, Herndon, VA 22070, 703-478-9881.

Pixelix (for the Mac)
Converts any graphics file in CGM format to PICT and vice versa. MS-DOS machines use CGM in such programs as Harvard Graphics, Freelance Plus, GSS/CGI, and Conjure. CGM is also used by DEC and Data General computers. Of course, PICT is used by Macintosh. $150. Ulo Pukk of Melbourne University, P.O.B. 4070, Victoria, Australia 2052.

XPort (for the IBM)
Translates graphics files across different formats. Supports translations between PICT1, PICT2, GEM, DRW, and CGM formats. More formats are scheduled for upgrades. Comes bundled with run-time Windows. $395. Micrografx, 1303 E. Arapaho Rd., Richardson, TX 75081, 214-234-1769.

ILLUSTRATION

CA-Cricket Stylist
(for the Mac)
This PostScript drawing program is the successor to Cricket Draw, positioning itself between MacDraw II and Illustrator 88. Supports 32-bit QuickDraw and both object-oriented and bezier drawing. Includes text-manipulating capabilities such as kerning, stretching, skewing, rotating, and binding text paths. Imports PICT, PICT2, EPSF, and MacPaint files. $295. Cricket Draw owners upgrade for $99.95. Computer Associates, 601 Gateway Blvd., Suite 100, South San Francisco, CA 94080, 415-857-1600.

Corel Draw (for the IBM)
One of the better IBM drawing programs is now available for Presentation Manager, IBM's new interface in the OS/2 environment. Includes a feature to convert typeface outlines from font companies. Imports Illustrator EPS, CGM, TIFF, PCX, Lotus PIC, and PIF formats. Will also export to most of these formats. Supports Pantone and process color. $595. Corel Systems Corp., 1600 Carling Ave., Ottawa, Ontario, Canada K1Z BR7, 613-728-8200.

ColoRIX VGA Paint (for the IBM)
Designed specifically for VGA and enhanced VGA displays. Supports eight VGA modes and includes a RIX-VIDEO program that lets users install the program for VGA cards which haven't been made yet. You can take full advantage of VGA, whether you're an experienced computer artist or a business person looking for the best possible presentations. The program offers standard design tools plus sophisticated capabilities in an easily used format. RIX Softworks Inc., 18552 McArthur, Suite 200, Irvine, CA 92715, 714-476-8266.

DeluxePaint II Enhanced (for the IBM)
The upgrade for DeluxePaint II. New features include user modifiable tools, multi-color fonts (!), automatic color gradient and fills, 256 colors available at one time from a palette of over 262,000 colors. Contains 10 built-in brushes and the capability of using any object as a brush for custom effects. Special effects include stenciling, translucent tool for shadow effects, smoothing and anti-aliasing tools, and perspective tool for 3D effects. $129.95. Electronic Arts, 1820 Gateway Dr., San Mateo, CA 94404, 415-571-7171.

Designer 3.0 (for the IBM)
This is a significant upgrade to a popular pc business graphics product. Has improved text editing, color scanned-image support, and a slide show utility. Imports and exports to GEM and Mac PICT formats. Requires at least a 286 IBM PC compatible with 1MB of memory, hard disk, and EGA or VGA card and monitor. $695. To current owners of older versions, $99. Micrografx, 1303 Arapaho, Richardson, TX 75081, 214-234-1769.

Express Paint (for the Amiga)
Express Paint offers a virtual page that lets artists create much larger works than Deluxe Paint. Express Paint also offers PostScript output via a QMS ColorScript 100 printer. Express Paint has an area-defined text fill that though primitive is at least functional. Express Paint does not have animation, however. 206-694-1539.

MULTIMEDIA TOOLS

Atari CD Player (for the Atari)
Unveiled at COMDEX, this new CD player is capable of reading CD-ROM disks and of playing musical CD disks. The CD-ROM is supported by a Mega and ST- compatible DMA interface. $600. Atari, P.O. Box 3427, Sunnyvale, CA 94088.

Audiomedia (for the Mac)
A CD-quality digital audio recording and editing system for the Mac II line. $995. Digidesign, 1360 Willow Rd., Suite 101, Menlo Park, CA 94025, 415-327-8811.

ClipKeeper (for the Mac)
This HyperCard stack allows you to control VCRs through the Macintosh screen. Provides videotape indexing, retrieval, and basic editing. It is available to software developers who want to include it in their own products. Supports Control-S or Control-L protocols. Hard disk recommended. $129. Video Production Controls, 38 Newbury St., Boston, MA 02116, 617-236-7006.

HyperDoc 2.0 (for the IBM)
Stores and organizes multimedia information, including animation, video, audio, photos, graphics, and text using concept association. Now supports 256 instead of 16 colors. $1000. HyperDoc, Inc., One Almaden Blvd., Suite 620, San Jose, CA 95113, 408-292-7970.

VidClip Developer Toolkit Series (for the Mac, Apple IIGS)
Writes interactive video and multimedia applications. Uses software drivers and connecting hardware through the serial port to communicate with SONY VHS, 8mm videotape decks, monitors, and camcorders to produce interactive videodiscs. $498. Video Production Controls, 38 Newbury St., Boston, MA 02116, 617-236-7006.

PAGE LAYOUT

PageMaker 3.0 for OS/2 (for IBM compatibles, 80386-based models, or IBM PS/2 Series)
This PageMaker version operates under the new IBM OS/2 Presentation Manager operating system, which allows multi-tasking. $795. Aldus, 411 First Ave. So., Seattle, WA 98104-2871, 206-628-6594.

Personal Publisher (for the Mac)
Designed for nonprofessionals, this low-cost page layout program from Silicon Beach, makers of SuperPaint, includes templates and auto-layout mechanisms to guide the untrained eye and non-artist. $299. Silicon Beach Software, 9770 Carroll Center Rd., #J, San Diego, CA 92126, 619-695-6956.

PRESENTATIONS

Persuasion 2.0 (for the Mac)
This upgrade includes killer features such as transition effects for slide shows, the ability to import PowerPoint presentations (!), auto-template preview, easy switch between autotemplates, new professionally done autotemplates, drivers for Autographix and Dicomed output, and chart overlays. $495. ($75 for Persuasion 1.0 owners.) Aldus Corporation, 411 First Ave. So., Seattle, WA 98104, 206-622-5500.

PRINTERS

Colormate PS (for the Mac, NEC)
An Adobe PostScript color thermal printer with 8 megabytes of RAM standard and a 68020 processor. Twenty megabyte hard disk for font storage is optional. The new price point leader for this group at $9995. NEC, 1414 Massachusetts Ave., Boxborough, MA 01719, 508-264-8000.

ColorScript 100 Model 10 *(for the IBM, Mac, QMS)*
A less expensive version of its true Adobe PostScript color 300 dpi thermal printer. This model comes with less RAM (4MB) and no hard disk for font storage. It supports 8.5" x 11" and 8.5" x 14" sizes but not 11" x 17". Includes LocalTalk, SCSI, RS343 and Parallel. $9995. QMS, One Magnum, Mobile, AL 36618, 205-633-4300.

DeskWriter (for the Mac)
As do laser printers, this compact, quiet ink-jet printer prints text in 300 dpi. However, it has no memory or processor like most laser printers and is not a PostScript device, so rotated text and gray-scale graphics will look no better than they do on a black and white screen. Nevertheless, the DeskWriter is a lot cheaper than PostScript laser printers. One more thing—you can't cry on your output because the ink runs. $1195. Hewlett Packard, 100 Mayfield Ave., Mountain View, CA 94043, 800-752-0900.

continued on page 38

Crossing the Threshold of a Brave New World of Color

SEPARATION ANXIETY

■ *by Steve Hannaford*

Dipping into Color

The micro-based color-separation industry is still in training pants. But its eventual predominance seems inevitable for several reasons:

- a great widening of the color market to a host of new uses
- the growing scarcity (and consequent high price) of talented strippers, the craftsmen who "strip in" color images on a page prior to printing
- considerable savings, especially when several color images appear on a page.

Color work is of a much greater degree of difficulty than black-and-white typography and graphics. If you are planning to work with color separations from a microcomputer, ease into it. Color work requires more than just the tools. It requires knowledge, skill, and a lot of help and advice at first.

And don't get too enamored of the toys. As Glenna Burch, a principal of Granite Graphics in East Rutherford, New Jersey, told me, "It is so easy to fool around with a color program that designers can lose sight of all good basic design principles. Don't get over-complicated and produce expensive, hard-to-output graphics. It's too easy to create work that takes forever to run."

Getting Started

Working effectively with color technology usually requires close cooperation with an outstanding service bureau. If you can find one of a small but growing corps of PostScript service bureaus willing to work with color, you can start experimenting. You should pick the jobs that this approach can fit, and start with small jobs that have some margin of error. Remember that micro-based color printing and separation are still in their infancy, and that service bureau operators are learning to handle it just as you are. But the technology of color separations is developing fast; expect standard and more foolproof solutions to some of the major problems within a very few years.

Learning the color process is a major part of the battle. Color brings up a set of complex issues that are not easily mastered. "How do you get educated about color?" asks Steve Beckerman, owner of Design & Type, a highly rated San Francisco service bureau. "People go to school, they read, they speak to professionals; users constantly need to be reading trade journals and keeping abreast of things. The educational process hasn't really changed. This is what people should have been doing before, as opposed to just picking up the package and saying, 'Geez, isn't it easy? I can do anything.' That's the bad side of these platforms, especially for the Mac. So many of the problems we run into are because the user hasn't taken the time to really learn the system or the application."

Training in microcomputer-based color production is available from a few places, most notably Electronic Directions and Pratt Institute, both of New York; SIS in Boston; and Image Express in Lawrenceville, Georgia. The number of such training centers is expanding. But no classroom training can substitute for hands-on experimentation—old-fashioned trial and error (and error and error!).

Be careful, however, to take incremental steps. Don't plunge into the deep end of the pool before you learn how to dog-paddle. Bob Schaffel, manager of the SprintOut service bureau in New York, advises: "Look for the appropriate piece, and the appropriate content and printing situation to use it—a catalog, for example, or a print advertisement which isn't going to be studied as if it were destined for the Museum of Modern Art, so that if something is off in the color, your client is going to understand."

"There is a straightforward path for getting involved in color," says Steve Schaffran, head of the Color Group of Richmond, California, a color-software developer. "First there is spot color for text and the borders of text. Then colored illustrations. Last comes art like colored photographs. It's valuable for people to get into doing color by getting comfortable with each step in turn." Even Schaffran, who is selling color halftoning software, wants users to ease themselves into the more complex end of the business. "Begin in areas where the risks are low. You have to build up confidence through feedback that you are going to be able to do it."

Areas for Experimentation

Color "Comps": If you already are producing color work with conventional means, or if you are getting demands for color, you might want to start out easily by experimenting with color comprehensives (comps). Many graphic designers and publishers have found that they can prepare quick and inexpensive color comps to present ideas to clients. This advance guard is making use of color scanners, PostScript illustration programs, page-layout programs, and the QMS color PostScript printer, increasingly a fixture at service bureaus around the country. Desktop publishing techniques replace tedious manual methods for applying rub-on colors or creating very expensive proof-quality work with full separations.

The great thing about electronically created comps is that they can free the designer to experiment before asking for client approval. They also make the task of implementing client-suggested changes less onerous. So, aside from offering a savings in time and money, they can also be a spur to experimentation and free expression.

Since no one expects comp colors to be dead-on, getting approximate values is quite good enough for this work. Traditional problem areas like moirés, dot gain, under-color removal, chokes, and spreads are not a major problem with comps, since the idea of the design is more important than the precision of production details at this stage.

Color comps meet all three criteria of usefulness (time, money, sufficient quality) and can, in many organizations, quickly make a big difference in the budget. They also provide a good way to train people to deal with color in a less than critical arena, without risking the business. Many firms are now doing comps electronically; then for the production stage, they turn over an annotated comp with full instructions to a commercial color house using more standard color-separation technology like that from Scitex.

Short-Run Color Printing: A second area where color may be used successfully is in short-run color printing. This new application of color is barely possible in traditional printing, where a few hundred copies are generated between the time you turn on and turn off a high-speed press, and where the expense of a short press run is prohibitive. With color thermal printers and color copiers, users are finding it easier to do short runs of color print jobs. For meeting reports, badges, covers, and a host of other applications, we are seeing the birth of a new industry.

Color Illustration: In the last year, the fastest growth has appeared in a third area, color illustrations and diagrams.

Illustrators working with desktop-publishing color technology can combine sharp line illustrations, readable text at any point size, and subtle color effects. In traditional graphic arts, putting these elements together in one illustration can be a painstaking, one-way task, involving keylines, color specing, and a lot of Scitex operator time. On the microcomputer monitor, the process is pretty straightforward, and revision can be a snap. Again, the big advantages of DTP color work come from being able to make revisions relatively painlessly, rather than scheduling another session at the color separator's.

As Mills Davis, a Washington-based consultant in color publishing, says, "this kind of work [electronically produced line mechanicals] is cost effective now. People might object that it can take 30 minutes to an hour to do the separations on the Lino, but it's worth it because it can take three days with conventional methods to create, shoot, and strip."

Continuous-Tone Art: A fourth experimental area is the realm of continuous tone art printed at 100 lpi [lines per inch] screens or less. Such screening, appropriate for newsprint or coarser grades of uncoated paper, allows for a lot of mistakes. Color photos on newsprint are never held up to the highest standards, so "good enough" is the rule. Moiré patterns on absorbent paper are less likely because of the ink spread (though I'm told that they look worse when they do occur!).

There is a wide and growing market for what is termed "pleasing" color, as newspapers and weeklies are turning more and more to color, following the example of *USA Today*. This is particularly true in advertising

ILLUSTRATION: JILL MALENA

sections, where ad managers report a pent-up demand for product photos in grocery ads or for displaying houses for sale in real estate ads.

Choosing a Service Bureau

Once you have decided to work with color, the next critical task is finding a service bureau that can guide you through some of the problems. You want to find a group that is at least more knowledgeable than you are. The box in the right-hand column contains some suggestions from graphics experts on what to look for.

Conclusion

As with all new processes, the basic principles remain: start small, do some experimentation, and don't rush out to buy equipment you haven't seen or don't need. Above all, make sure that the new color methods meet your standards before committing fully. But be aware that today you can accomplish some pretty amazing things with color output on the microcomputer, things unimaginable just a year or two ago. And the time to start learning and using this new color technology is now. In the right circumstances, it can be very effective.

Tips on Choosing a Service Bureau

Paul Beyer, principal of Soho Color Graphics in New York
"Make sure they have the new generation of imagesetter recorders with improved transport mechanisms [mechanisms that move the film or paper through the imagesetter] so you get proper registration." Indeed, older equipment may not be able to do the job, since only slowly have the manufacturers begun to understand the problems.

"Find out whether they calibrate their imagesetter." And if they don't, be very suspicious. Maintenance problems that are invisible in black-and-white can be murder in color.

Kevin Hambel, designer of *Personal Publishing Magazine*
"Make sure your bureau is up to speed on film and that it has a densitometer [to check the density of film or type] and knows how to use it." Producing consistent and predictable film density is critical for color work. Do not trust a service bureau that claims it can do color work and does not have a densitometer in house. In fact, Hambel recommends that you have your own densitometer if you do a large amount of color work.

Bob Schaffel of SprintOut
" Get empirical experience based on the system and the working environment that you plan to use. Color is very dependent on environment. If you move your system to another corner of the room, color can change." The light conditions surrounding your color monitor can strongly affect what you see on the screen. If you work from the screen to check color, at least keep lighting consistent so that you can have a consistent baseline environment.

Glenna Burch of Granite Graphics
"If you get serious, spend the money to buy a calibrated monitor. Otherwise, you are just working with arbitrary colors on the screen." Calibrated monitors (see references to calibrated color in this issue of *Verbum*, pages 9,22) are not cheap, but they can guarantee something like consistency of color.

Doug Chezem, an illustrator from Fairfax City, VA
"Get a service bureau with a deep-bath film processor for halftones [that fully submerges film], because you can get streaking from shallow-bath processors [that use a spraying technique to develop film]." The imagesetting is only part of the job. The film processing is the other crucial part.

"Find a service bureau that has a PostScript guru who knows what he's doing." There's no substitute for real, in-depth knowledge.

David Hester, VIP systems in Alexandria, VA
"Find a printer who will work with you." Many printers don't want to work with films produced on the imagesetter. Others are happier to take on the challenge. It may take some work and some recommendations to find one who is willing to work cooperatively with you.

1

GLENN MITSUI
JEFF BRICE
JESSE DOQUILO

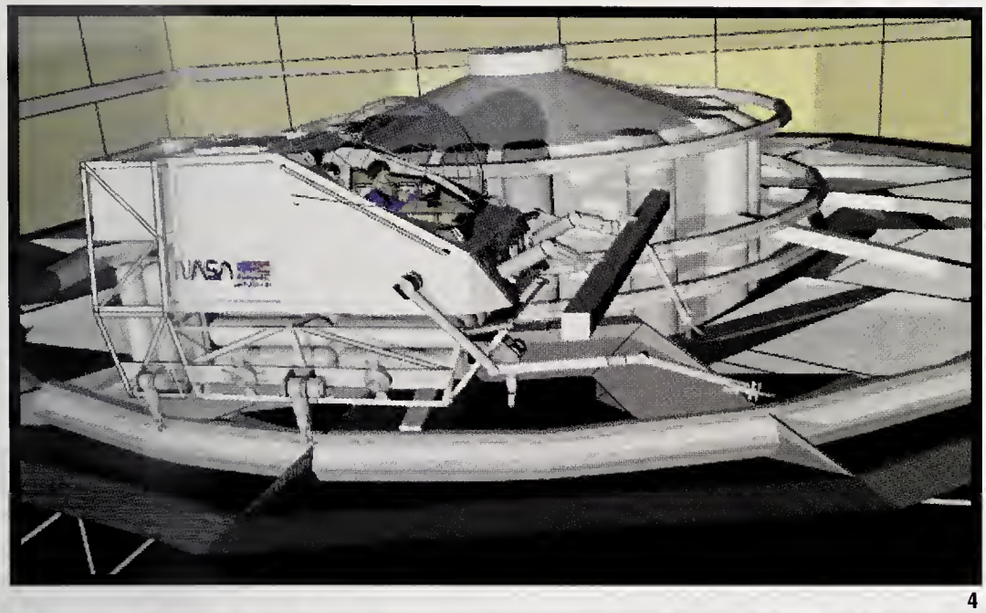
1 Republic of Design T-Shirts
A series of "postage stamp" t-shirt designs (see Intro spread) were developed by M Design's Glenn Mitsui using FreeHand on a Macintosh II.

2 August Calendar
The three partners in Seattle's M Design developed this calendar poster for *Pacific Northwest* magazine. The design development and camera-ready art were prepared on a Macintosh II with PageMaker and FreeHand. The final illustration was produced using a Computer Graphic Lab high-end paint system. The waves and marble textures were scanned in with an Eikonix scanner, and the clouds were rendered on the paint system. The illustration was output to a Celco 8000A film recorder as a 4000-line, 8 x 10-inch transparency. The Mac-generated camera-ready art and a traditional separation of the illustration were stripped for 6-color offset printing. (Reproduced here from a slide of the printed piece, separated traditionally.)

3 Intuitive
This work by Jeff Brice at M Design was developed using Corel Draw 1.1 on an IBM-AT system and output on a Matrix PS 2000 film recorder at 2000-line resolution.

2

3



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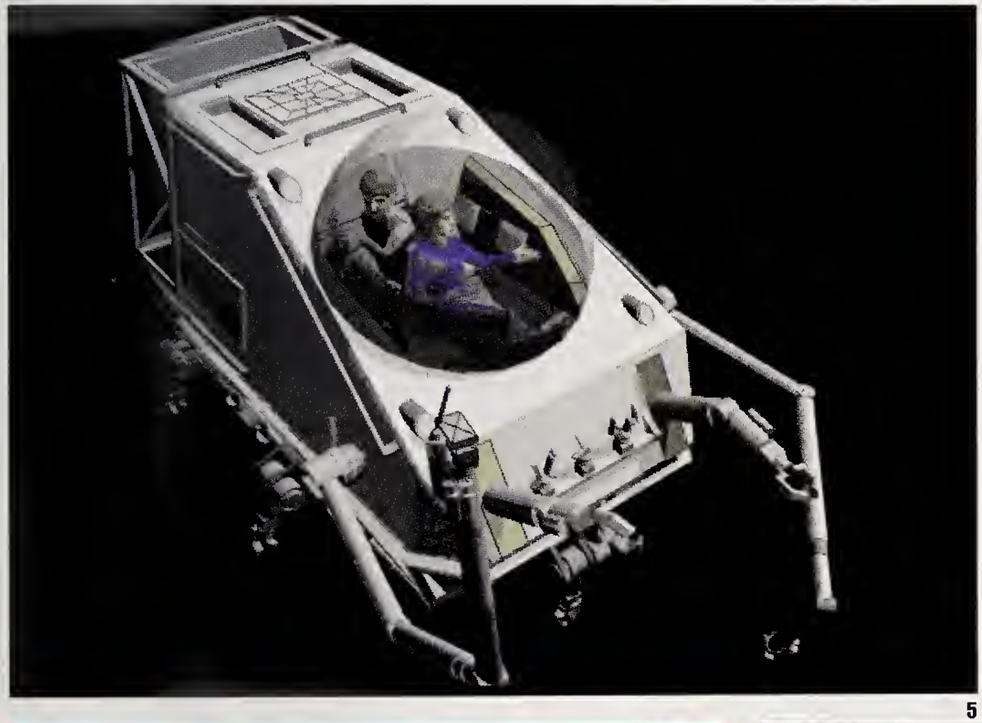


5

JOE SPARKS

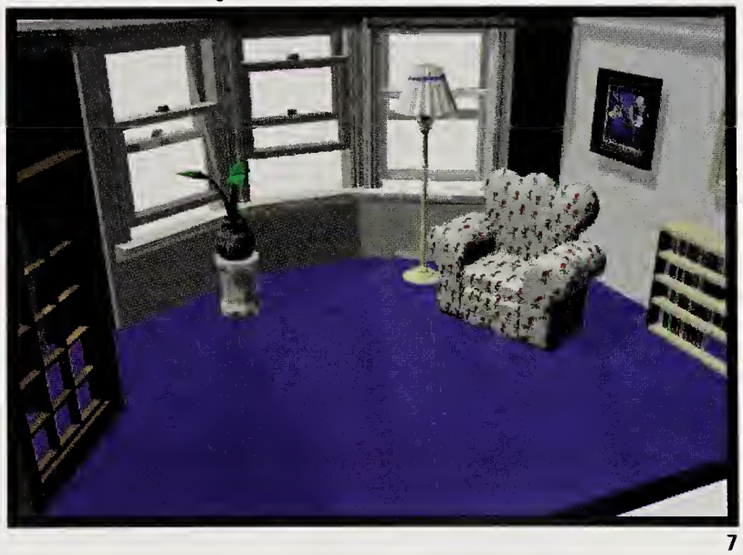
Mr. Sparks, an active multimedia producer, teacher, and industry speaker, was one of the first artists to work with Swivel 3D. Shown here are recent works created with this application. The Paracomp program, written by Young Harvil, was rooted in his original software for the DataGlove (the virtual reality tool from VPL Research). Joe Sparks resides in San Francisco.

4,5 NASA Sub
These graphics are stills captured from a 10-minute animated video produced entirely on a Macintosh IIcx with Macromind Director. The video, produced for NASA/AMES Research, incorporates graphics, animation, music, voice-over script, digitized images, and sound effects. (All works separated here through PixelPaint.)

6 Astral Throne
This piece is a still from an animation. Textures on the throne and pillars were hand-drawn in Studio 8 and applied in Swivel 3D.

7 Domestica I
Still from an animation produced with Swivel 3D, Macromind Director, and Studio 8.

6



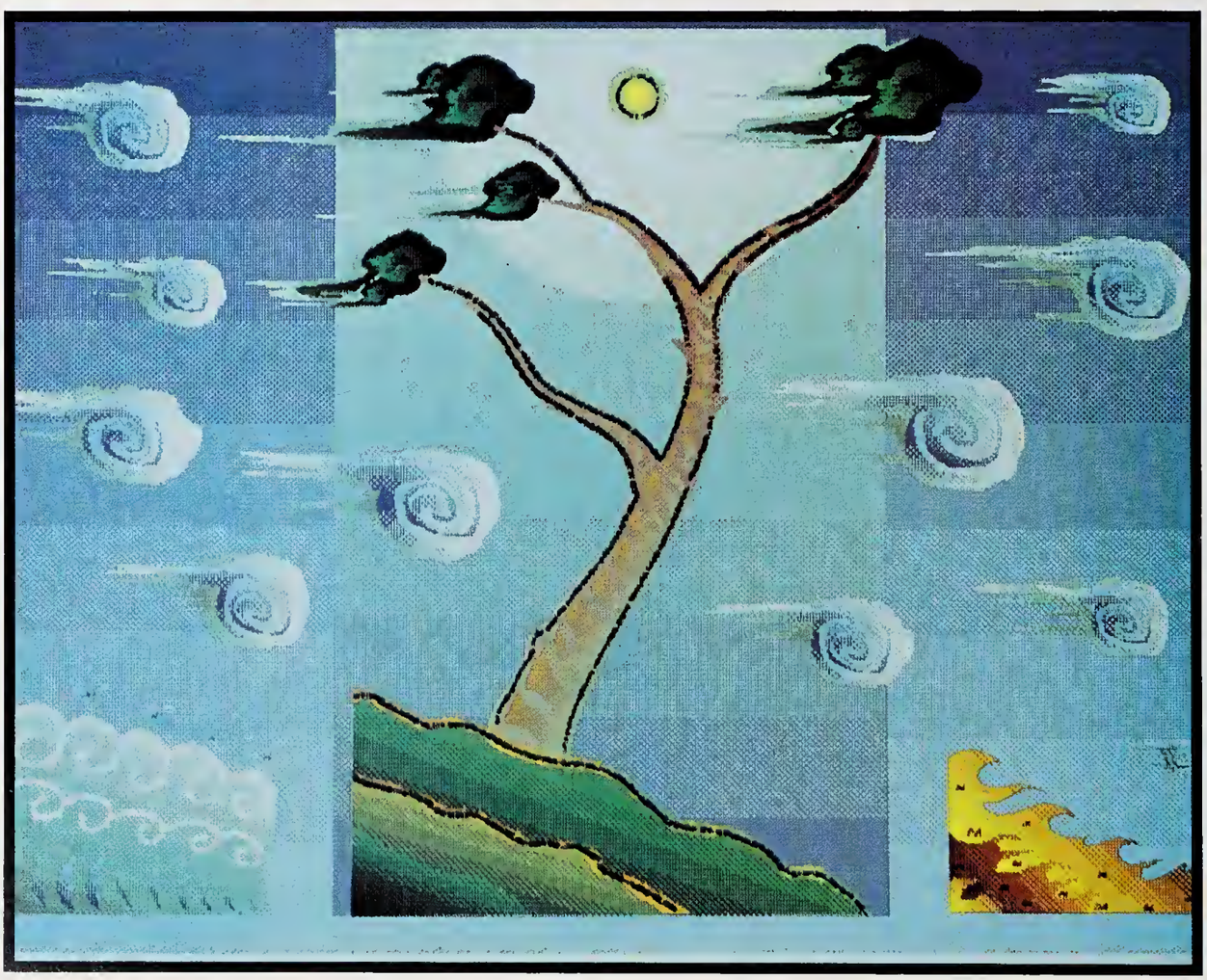
7

BONNIE MELTZER

Portland artist Meltzer has been experimenting with Macintosh-generated art and laser output treated with the Kroy Kolor system. The Kroy machine allows users to colorize laser (or photocopy) prints by running a sheet of color film on top of the print through the machine's heat rollers, thereby fusing the color material to the toner on the laser print. A range of colors includes several foils, which Meltzer has used extensively in these collage works. She mounts the laser/Kroy cutouts with paste, adding touches of color with paint. (All images separated traditionally.)

8 Golden Fish
30 x 40-inch collage using Kroy Kolor metallics.

8



9

JANET ASHFORD
MICHAEL GOSNEY
ED ROXBURGH

9 Life Tree

This collaborative work was developed in FreeHand 2.0. Gosney and Roxburgh worked out the design, incorporating Gosney's text (tree outline and ground) and Roxburgh's tree illustration. Janet Ashford completed the piece in FreeHand (with help from Jim Hance). The 40 x 30-inch work was created for inclusion in the IMAGINE TOKYO '89 exhibit, but unfortunately has yet to be printed successfully as a 16-tile piece on a PostScript color printer. (Conventional separation here from a transparency shot off the color monitor.)

MICHAEL SCARAMOZZINO

Working from his Dreamlight Studios in Providence, Rhode Island, illustrator Scaramozzino works with both Mac and Targa/IBM illustration programs.

10 Looker
This illustration was developed with the Techgraphics II paint program on an Imagraph-equipped IBM-AT compatible. (The traditional separation here was made from a transparency shot directly off the color monitor.)

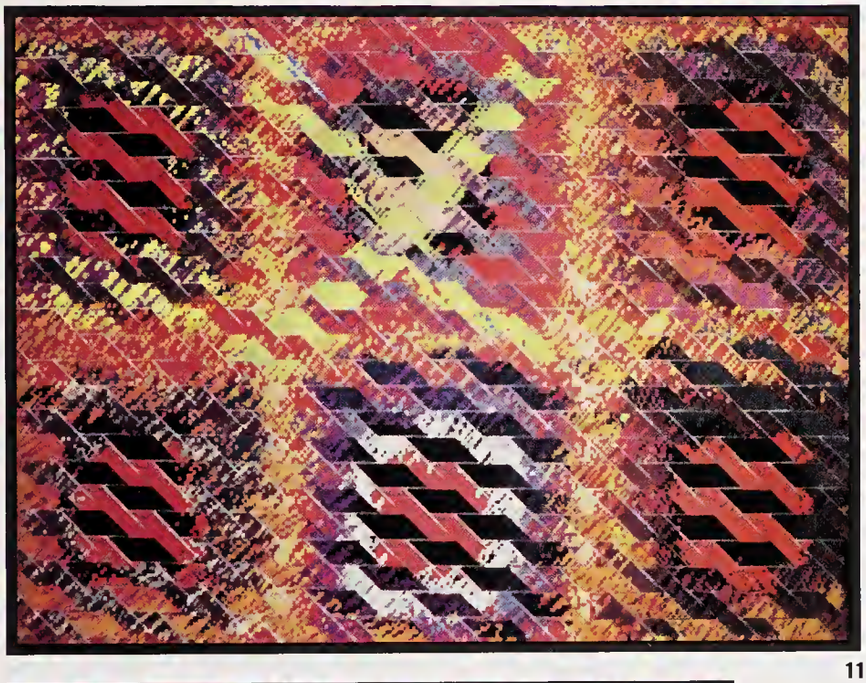
10

TRACY COLBY

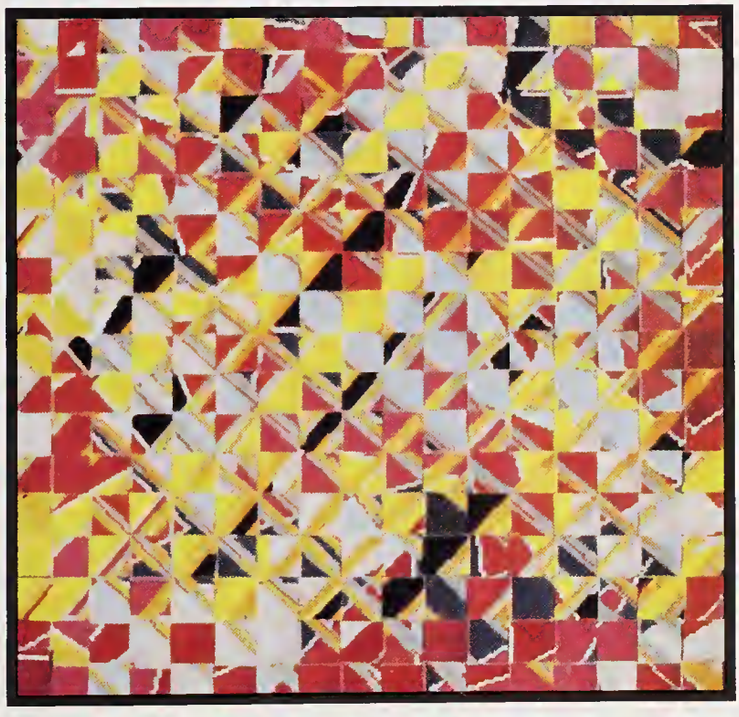
A Portland textile and computer artist, Ms. Colby has been correlating the woven patterns of textile design with the pixel grid of pc art in her interesting "woven output" compositions. "The woven prints are really a marriage of the print, the printing process, and the pixel structure. They transcend computer art, emerging as one-of-a-kind experiences." She works with DeluxePaint II on an Amiga 1000, and outputs the works on a Tektronix 469 3-D color thermal printer.

11 Six Holes, None Blue
19 x 21 inches , framed.
Woven color laser prints.

12 Rain Dance
13 x 13 inches, framed.
Woven color thermal prints from the Tektronix 469 3-D.



11



12

13

GREG PACE

13 Calendar
A graphic designer based in Seattle, Washington, Pace developed innovative handmade calendars using a Hewlett-Packard PaintJet to print on canvas. He used a photocopier and manual cut-and-paste to combine a photo of an existing can with the peach graphic, and then scanned the final photocopy with an HP Scanjet. He then opened the resulting line art in FreeHand on the Mac and used the sizing tool to reduce the graphic to fit the format of the PaintJet. Finally, he used PixelPaint to skew and colorize the piece. It was printed from PixelPaint using the Hewlet-Packard PaintJet directly onto primed canvas, which was then sewn top and bottom, and finished with wood dowels. The calendar section at the bottom was output on a laser printer, padded, and adhered to the canvas. (Separated here from a slide of the finished calendar.)

ARCHITECTURAL CAD

on the Macintosh

■ *by Phil Inje Chang*

The Mac Connection

An increasing number of architects and engineers are using personal computers in their work, and in particular, the Macintosh. Computer-Aided Design (and Drafting) (CAD) on the Mac platform has warmed up in the past couple of years, with general-purpose programs like VersaCAD, MicroStation, and AutoCAD appearing in comprehensive Mac versions, and more specialized architectural programs like ModelShop and ArchiCAD appearing solely for the Macintosh. For architecture and architects with their graphic orientation, the Mac's time has come.

Many architects and those readers more familiar with the conventions of graphic design or basic drawing programs like MacDraw may have only a vague notion of what CAD is. Before Adobe Illustrator appeared, CAD seemed to denote some professional level of drawing on a computer. Illustrator, in fact, borrows extensively from the world of CAD while staying true to the nature of PostScript, providing unprecedented free-form precision to the world of graphic design. (Aldus FreeHand is similar in nature.) CAD, however, has traditionally emphasized structured, precise drawing, and is descended from the world of mainframes serviced by dedicated programmers and operators, who laboriously performed those design tasks that were too complicated or required too much precision to do by hand (or that eventually interfaced with a machine, as in Computer-Aided Manufacturing).

Hence, CAD was often associated with heavy-duty industrial applications, mainframes or minicomputers, and specialized, cryptic applications. As CAD became more affordable, a demand grew for more accessible programs with lower learning curves. This is one reason the Mac is being advocated by some architects. The other is that the graphic language of the Mac is completely in tune with a profession that prides itself on visual style and clarity.

CAD Basics

What is CAD(D)? In a sense, the term CAD can apply to any computer application that aids the design or drafting process. It is also a buzzword that helps the computer industry package a range of products for the AEC (Architecture/Engineering/Construction) markets. The CAD products of five to ten years ago were oriented more to drafting—and were fairly uninteresting to most architects, who often defer the task of drafting to others. Today, the Mac in particular can offer more in architectural design because of its 3D modeling, painting, and rendering tools.

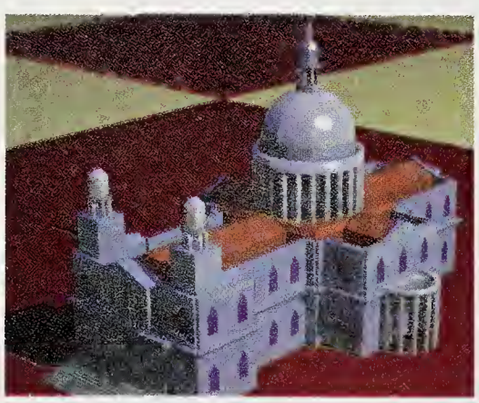
To distinguish CAD from general drawing or design, look for the following general characteristics in drafting programs:

- *special drawing features* like fillet and chamfer (rounded and squared off corners) and multiline (parallel-line) drawing
- *a command or prompt window* in many cases, since many commands require several steps to complete
- *dimensioning*, or the measuring and labeling of drawn elements
- *snaps and modifiers*, which constrain cursor movement and drawing actions in unique ways
- *plotter support*.

Among 3D programs, look for extrusion and revolution (or lathing), various kinds of axonometric and oblique projections, elevations, perspective views, hidden line removal, and surface or solid modeling, etc. The painting and rendering tools most often used in CAD are powerful multiple-bit-per-pixel programs with options for ray tracing (for shading, shadows, and reflectivity), various kinds of surface mapping (for textures and material simulation), and special retouching tools.

Within the field of CAD, there is a general distinction between architecture and mechanical design. Some programs, like AutoCAD, try to cover the whole spectrum. The distinction between the two areas is partly a matter of convention (as in the

1 St. Paul's Cathedral rendered in StrataVision 3d.
2 Floor plan in VersaCAD II.
3 An interior perspective generated as a solid model and shaded with contours in ArchiCAD, based on a design by Belgian architects Marc Corbiau and Marc Lust.



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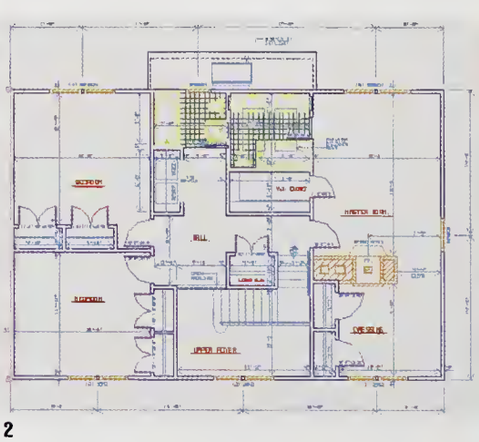

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style and type of dimensioning, units, scale designations) and partly a matter of functionality (as in the relative necessity of fillets, chamfers, and radial dimensioning for mechanical design but not for architectural drafting). Some programs maintain a specialized emphasis on one or the other. In-CAD, for instance, has almost the same functionality as programs like ArchiCAD or Architrion, but resolutely limits itself to the field of mechanical design. Since most of the programs reviewed here are general purpose, general CAD features will be discussed. But before moving to the programs, let's look at a troubling development in the field.

The Two-Headed Beast

Within the field of architecture, an uneven acceptance of the new technology is spawning a dichotomy of sorts, a virtual two-headed beast. This beast is a polarization within the profession regarding the appropriateness of the CAD technology.

It seems that some of those most involved with incorporating pc's into the world of architecture, like Jay Pace at Taliesin West and Chuck Rush at the University of Oregon, have mixed feelings. Mr. Pace, Director of Computer Services at the center for the continuing legacy of Frank Lloyd Wright, notes the disturbing tendency among young apprentices to embrace computers and strive for "Mattel's vision of the future. Their designs end up being sleek and sterile, without much concern for natural materials and human feeling." He believes in a healthy interplay between CAD and drawing by hand, and feels that most CAD programs underemphasize the importance of painting functions. None of the programs reviewed here are strictly painting programs, although any bitmap editor, from MacPaint to gray-scale and true color editors, could serve the purpose of rendering or sketching "by hand."

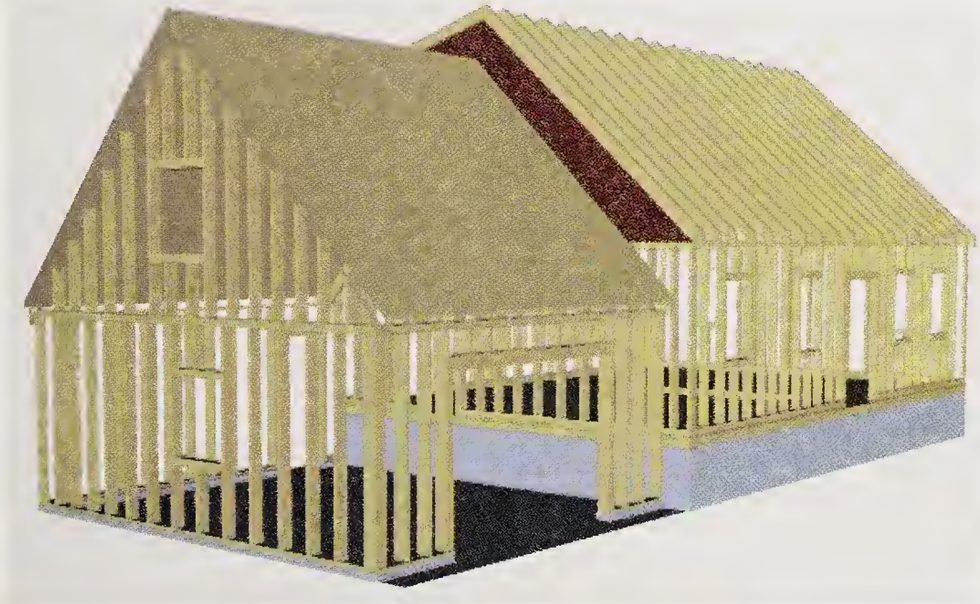
Chuck Rush, an architect and computer visionary, originally predicted the emergence of 3D design because of its parallel with the natural flow of ideas from the mind and hand of the architect. He noted over 25 years ago that the traditional process of drawing in plan and then generating 3D views is a reversal of the actual design process. (More on this in the 3D section below). Mr. Rush is a firm believer in sketching, and puts his students through a rigorous program of pencil sketching before beginning volumetric studies in Architrion. "There isn't a sufficient appreciation for the complexity of thought during sketching," he says, and notes that after tracing layer upon layer of a design, "sometimes the idea emerges right out of the paper." He is a firm believer in the future of CAD and believes that one day soon we will have one model for all the information in and regarding a design. This is akin to the idea of the creation of a virtual reality on a computer (see Verbum 3.3, "On Dramatic Interaction").

What we are beginning to see in the field of architecture is similar to what happened in the field of graphic design. The older, established architects are holding on to their traditional principles and ideals and are holding back on entering the arena of CAD design, while the younger architects are eager to play computer god and want to see it all on screen at the expense of tradition.

As in desktop publishing, the computer industry has yet to learn a few things about the principles and practice of architecture. On the other hand, some of the tools available today are revolutionary and are doing much more than simply aiding design. Just as PostScript and Illustrator offered new capabilities and a new method of working, so too some of the architectural design tools are not just enhancing our productivity, but are *radically changing the way in which we produce.*

One thing that should goad the old guard into some kind of action is the ever-present threat of obsolescence. As Jay Pace sees it, an ever smaller percentage of buildings today are being designed by architects, and already in the works is a program that will generate a design automatically from a description of the lot and the number of rooms desired. Yes, every architect's nightmare, at your local building supply, happening soon!

The polarization between the old guard and the new guard is largely due to a lack of communication. Communication is a two-way street. As much as the computer industry needs to listen to architects, architects also need to understand what the computer industry is trying to do to help them.



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4 A simple frame and foundation designed in Design Dimensions and rendered in Presenter.
5 The Boston cityscape created in ModelShop.

The Line-Up of CAD Programs

As in almost any category of Macintosh application, the field of architectural CAD currently shows a healthy diversity. Many programs occupy interesting niches in the

market. A program called FlexiCad provides a link between CAD and the strictly desktop world of Adobe Illustrator, as well as to Computer-Aided Manufacturing. Some programs, like Microsoft Excel and Farallon's Timbuktu products, incidentally offer the field of architecture productivity benefits. (Excel provides number-crunching power, while Timbuktu allows interactive graphical communication between different Mac users and has many potential uses in workgroup or remote communications.)

Since architects require a broad range of design and drafting capabilities, the market supports a broad range of products to fit their needs. These products can be categorized in many ways, but perhaps the most straightforward is as follows:

- *2D drafting*
- *3D design*
- *high-end 2D/3D programs.*

Among 3D programs, there are important distinctions that will be made later. Programs geared exclusively to 2D or 3D work are generally lower in price and have broader applications. Claris CAD, for instance, supports conventions for mechanical design as well as architectural drafting. In the 3D world, ModelShop facilitates the process of "sketching out" volumetric ideas of almost any sort.

One of the main advantages of the world of personal computer design is the ability to create and produce at the same time: early designs can be used as the basis for final documents.

In the 2D/3D stratosphere, design and execution become more closely integrated, depending on the nature of the program. Such high-end applications can be roughly divided into two camps: general purpose and dedicated. The philosophy behind each camp makes sense: "If you're going to make an expensive product, make it all-encompassing," on the one hand, and "architecture deserves a tailored and optimized product," on the other.

The following programs were run on a Macintosh IICX with 8 MB RAM, several hard disks, and the Apple 8-bit video card and color monitor. I tried to capture the unique flavor of each rather than giving comprehensive reviews. Copy protection is, unfortunately, a fact of life for CAD software because some programs cost upwards of several thousand dollars.

2D Drafting

Among 2D programs, there are those that have migrated down from mainframe environments and those that have evolved up from MacDraw. We start with the latter. Architects, bear with us, since many of you may already know this area well.

MacDraft 1.2b, Dreams 1.0

Innovative Data Design, Inc., 2280 Bates Avenue, Suite A, Concord, CA 94520, 415-680-6818.
Macintosh: any
Memory: 1MB RAM, hard disk
Price: $269 (MacDraft), $500
Copy-protected: no

MacDraft was the original "better-than-MacDraw" program and still has some adherents. It's extremely simple to learn if you know MacDraw, and has enough in the way of basic drafting tools to satisfy some drafters. Dreams represents a significant enhancement of the same format and encourages spontaneity in design.

In Dreams, the toolbox on the left supports pop-up alternatives, and an additional toolbox on the bottom provides quick access to features like rotation (and return to original orientation), add a vertex, combine shapes, break, and fillet. Multi-line shapes are easy to draw. Ease of use and moderate sophistication place this product in its own category of 2D design. Many architects, however, will probably begin to appreciate the benefits of designing in 3D (see 3D below).

Claris CAD 1.0

Claris Corporation, 440 Clyde Avenue, Mountain View, CA 94043, 408-987-7000.
Macintosh: any
Memory: 2MB RAM, hard disk
Price: $799
Copy-protected: no

This program targets both the architecture and mechanical design fields, and is fairly comprehensive in approach. Claris has taken the old MacDraw format many steps further, while maintaining the smoothness of the interface. Many tools in the toolbox sport a full range of pop-up alternates, and almost all of the drafting basics are represented.

As the excellent tutorial video explains, most of the power of the program is concentrated on the left side of the screen, which is divided into tools, drawing methods, and drawing modifiers. Chained and datum (with tolerances for mechanical design) dimensioning and angular, radial, and diametral dimensioning are supported, as well as sophisticated modifiers like percentage offsets (to start drawing at 35% of the length of an existing line, for instance). Claris has certainly done its homework and come up with much more than a bigger and better MacDraw. Claris CAD has all the seriousness of CAD and yet all the elegance and ease of use of a classic Mac program. It is not, however, loaded with the conveniences architects crave. It can create parallel-line polygons, for instance, but they have to be properly closed by hand. A Graphics Translator program ($295) is available to convert to or from DXF (the standard established by AutoCAD), IGES (Intergraph and mainframe), Claris CAD, MacDraw, and PICT. A library of 2700 symbols is available from Advanced System Design for $120.

PowerDraw 2.0

Engineered Software, P.O. Box 18344, 615 Guilford-Jamestown Rd., Greensboro, NC 27419, 919-299-4843.
Macintosh: any
Memory: 1 MB RAM, hard disk recommended
Price: $795
Copy-protected: yes

This program has so many menus that the creators resorted to abbreviations like "W" for "Window." This is not a criticism. PowerDraw is feature-packed and easily lives up to its name. Besides supporting a Pascal-based macro language, it has features like Smash to Lines and Surface Operations like Combine, Attach, and Clip for easy dissection and combination of shapes. B-splines as well as Bezier curves are available in the program (B-splines are more common in CAD systems and are technically smoother than Beziers).

, PowerDraw emphasizes speed wherever possible. For example, if you change your mind or make a mistake, you can save time by halting screen redraws in mid-course. Some features are not apparent in the menus or toolbox because they are so "ingrained" in the program, like object adjacency (or surface-to-surface snap). Other features, like the creation of isometric projections of a 2D plan, are not built in; though it is basically a 3D or "2-1/2"D function (see Versacad, below), a sample file details how to go about creating the projection using the available tools.

A clock starts ticking the moment you open a file, a useful feature for client-billing purposes. Viewed favorably by a number of architects, PowerDraw has a host of third parties marketing goodies like formatted details, which are essential for the creation of finished working drawings (contact Intuitec Software Inc. in Ontario). Future Vision Computer Systems Ltd. of Calgary, Alberta, has developed a companion program called Add3D for producing wireframe models from PowerDraw files, which can then be enhanced in PowerDraw or Super 3D. Engineered Software also offers a number of specialized symbol libraries, a DXF translator, and MacPlots II, a popular plotting utility.

Generic CADD Level 1, 1.1

Generic Software, 11911 N.Creek Parkway South, Bothell, WA 98011, 206-487-CADD.
Macintosh: any
Memory: 1MB RAM
Price: $149.95
Copy-protected: no

The most inexpensive of the programs descended from higher-end CAD (or anywhere else), this unassuming program was a pleasant surprise. Its database is floating-point based, so a math co-processor is recommended (standard on the Mac II and higher). The straightforward interface has a command window and much of the look and feel of more sophisticated and much more expensive programs.

Virtually unlimited zoom, unlimited drawing area, 256 layers, multiple kinds of snap, full symbol support, several included symbol libraries, and a full complement of other features make this program more than a bargain. One stumbling block, however, is the lack of scroll bars. Panning a view can be very flexible but awkward, since you must click at the center

6 The interior of a house by Frank Lloyd Wright rendered in StrataVision 3d.

of the desired view (a view rectangle would be helpful). On the whole, this low-cost descendant of higher-end CAD systems is a solid performer. Generic, by the way, was recently acquired by Autodesk, makers of AutoCAD, and has released Generic Level 3 and 3D Drafting on the PC, also low-cost, fairly sophisticated CAD solutions.

Snap! 3.1

Forthought, Inc., P.O. Box 32, Sunset, SC 29685, 803-878-7484.
Macintosh: any
Memory: 1MB RAM
Price: $395
Copy-protected: no

Modeled after an Intergraph workstation, Snap! offers an easy and affordable migration path for those more used to mini and mainframe environments. Extensive support for a digitizing tablet includes a graphic command template, similar to ones provided with MicroStation Mac (from Intergraph) and AutoCAD. In lieu of a toolbox on screen, the user can create custom graphic menus and call them up as needed.

Also like Intergraph CAD environments, Snap! provides access to up to five reference files which can act as overlays. These files can be read from another Mac over TOPS or a similar network server and be used in read-only format, while retaining object-snap characteristics. This allows various departments or specialists to work on their own contributions to a project based on the same original plan. Changes to the referenced file will be reflected in the other stations' windows. Password-protected time accounting is also a built-in feature of the program.

As you could expect from its ancestry, Snap! provides a link to VAX and mainframe-based Intergraph files through the Snap!/Intergraph translator, which costs $195. For an easy way to integrate the Mac into more traditional CAD environments, Snap! is a worthy solution.

FlexiCAD 1.2

Amiable Technologies, Inc., 3508 Market St., Suite 210, Philadelphia, PA 19104, 215-222-9066.
Macintosh: II family, SE/30
Memory: 4MB RAM, hard disk
Price: $1495
Copy-protected: no

FlexiCAD offers high-level CAD and interesting links to the standard Mac environment. It can import and export DXF as well as Illustrator formats, and exports to Swivel 3D and Super 3D. The program is also being used for sign creation by directly driving vinyl and plastic cutting machines.

Its exhaustive list of features make this program a definitive CAD solution for any kind of 2D drafting. The manual is similarly thorough and makes no assumptions that you are an experienced CAD user. Command templates can be established for the screen, keyboard, and digitizing tablet, and the macro facility is fairly flexible. The grid options are the most thorough of almost any CAD program, and include rectangular, angular, unit system, isometric, absolute and relative polar, and reference. The cardinal and B-splines and Bezier curves supported in the program are all converted to Beziers when exporting to Illustrator. FlexiCAD is a high-level program that is thoroughly cognizant of the Mac market.

topCAD 1.2

Graphisoft, 400 Oyster Point Blvd., Suite 517A, So. San Francisco, CA 94080, 800-344-3468.
Macintosh: II family, SE/30
Memory: 2MB RAM
Price: $2600, $5300 in combination with ArchiCAD
Copy-protected: yes

From the makers of ArchiCAD (see 2D/3D Programs, below), topCAD offers an exhaustive list of features that would be hard to beat. As in ArchiCAD, there is an excellent adherence to the Macintosh interface, and available options are easy to see through pop-up menus or a secondary toolbox of modifiers that changes with the tool selected. Through standard dialog boxes you can create custom menus, icons, fonts, and tools, and 19 levels of undo and redo are available as clickable icons. There are 21 methods for drawing a line and 27 methods for dimensioning, and extensive support for tablets and plotters. Preferred values can be set for most tools and transformations. The list goes on and on; yet all these features are fairly accessible and easy to use. Since the 2D drafting portion of ArchiCAD is not that elaborate, Graphisoft probably intends that topCAD users do general drafting in ArchiCAD.

3D Design

Many architects will agree with Chuck Rush that the process of architectural design is enacted in reverse. The early stages of the process involve three-dimensional conceptualizing, loosely represented in sketch form. As the ideas solidify, models are often constructed to get a better sense of volumetric space and to aid in client communication. When the project is finally ready to be committed to paper, a 2D plan must be carefully and laboriously executed. From 2D drawings like a plan, elevations, and sections, the building is finally constructed.

The 2D programs described above can help with some of the tedium in generating 2D drawings, but what about the whole creative process that occurs before that stage? As you can see, CAD traditionally began with the end of the process. A wealth of new tools are emerging to help architects manipulate and refine their ideas in 3D. There may not be any total replacement for the sketchpad, but some forms of sketching are now easier than ever before. The majority of 3D programs, however, emphasize finished images for presentation and incidentally aid the design process.

Before we begin our review, let's make clear some of the terminology involved in 3D modeling. In terms of intended purpose, there are *presentation modeling* and *design modeling* programs. The former emphasize good-looking perspectives and projections over convenience in construction. Most programs can serve both purposes to some degree. In terms of data structure and modeling capability, there are *surface modelers* and *solid modelers*. Most Mac 3D programs are surface modelers that can paint the surfaces of wireframes (or just remove hidden lines). In fact, none of the programs in this section support true solid modeling (see the next section). The renderers covered here can add photo-realistic surfaces to 3D structures via ray tracing and various kinds of surface mapping.

A note on system requirements: the memory requirements listed are a minimum. Almost all the programs listed below will benefit from more RAM, especially when running with MultiFinder. Some of the programs not included here are Swivel 3D and Zing (formerly Pro 3D), which were not received for review, and SpaceEdit and Zoom, which are not distributed in the U.S.

ModelShop 1.0

Paracomp Inc., 123 Townsend Street, Ste. 310, San Francisco, CA 94107, 415-543-3848.
Macintosh: any
Memory: 1MB RAM
Price: $595
Copy-protected: no

From the makers of the ever-popular Swivel 3D, ModelShop is the only 3D program specifically intended for architectural design. It is probably the closest thing to a design modeling program there is, with the rather unique feature of allowing you to edit and manipulate in perspective views. This feature allows you to live and work almost totally in a perceived 3D space, unlike practically all other 3D programs, which require you to draw and edit on one or more 2D planes.

Although it is a surface modeler designed for rapid volumetric sketching, it does allow the unique feature of generating a hole in most shapes, within certain limits. This is normally a Boolean operation available only in solid modeling. For architectural design, this feature alone can be quite a boon to productivity and creativity.

Written by a professor of architecture at Harvard, ModelShop is exceptionally well suited to the architectural design process—if only it were better understood by its intended audience. At the very least, it could serve as a replacement for intermediate cut-out models. At the very best, it could significantly aid an architect's creative thought.

Super 3D 2.0

Silicon Beach Software, 9770 Carroll Center Road, Suite I, San Diego, CA 92126, 619-695-6956.
Macintosh: any; for color, a color monitor and math co-processor required
Memory: 1MB RAM
Price: $495
Copy-protected: no

This program is designed for powerful, general-purpose 3D modeling. Features like Connect Cross Sections (for a way to create irregular solids) and solids of revolution with a hole (as in a torus or doughnut) and incremental scale during revolution (as in a nautilus shell) set this program apart from many 3D programs. It also has built-in animation with tweening and unlimited camera control, although this area of the program seems less intuitive in design than the rest of the interface.

Super 3D covers a lot of ground fairly well. Barry Pendergast of the Pendergast Group in Calgary has used this program in conjunction with PowerDraw (See PowerDraw above) and Design Dimensions (see below) to generate finished views of some of his projects.

DynaPerspective 1.20

Dynaware 1163 Chess Drive, Suite J, Foster City, CA 94404, 415-349-5700.
Macintosh: II family, 8-bit video card and color or gray-scale monitor
Memory: 2MB RAM
Price: $1495
Copy-protected: no

This flashy product from Japan addresses itself more specifically to the field of architecture, although it is functionally similar to Super 3D. Some of things that set it apart include: rotational arrows for easy manipulation of the perspective view, optimized surface modeling that works on the principle of hidden surfaces (rather than hidden lines), semi-transparent fills, and multiple key frames with batch-like generation of rendered animations.

Positioning itself squarely in the area of presentation modeling, DynaPerspective seems to be based on the belief that medium-range CAD ought to make the most of appearances. The semi-transparency feature, one of the unique aspects of the way surface modeling is performed in this program, is a case in point. Windows or polygons with semi-transparent fill will show through to objects on the other side, creating fairly realistic presentations. See-through openings are normally a feature of solid modeling. In a kind of trade-off, the creation of windows involves the creation of walls above and below as well as the window between, and the manual recommends saving the whole unit as a library element. This is not an especially convenient way of inserting windows. Stairs, on the other hand, are quite easy to generate.

Some users have been polishing up views generated in DynaPerspective in Studio 8 or Pixel Paint for that extra touch of "walk-around" realism. Other users are bringing VersaCAD 2D documents into DynaPerspective. Animations can be created with considerable flexibility but can take some time to generate. Although sketching might best be done in other ways, this program is a leading example of presentation modeling in the 3D arena.

Design Dimensions 2.11 (et al)

Visual Information Development, Inc., 16309 Doublegrove St., La Puente, CA 91744, 818-918-8834.
Macintosh: any
Memory: 2MB RAM on IIs
Price: $1595
Copy-protected: no

In conjunction with Dimensions Presenter, Dimensions Interpreter and RayTrace Dimensions, this product takes presentation modeling to its logical conclusion, while providing output to VersaCAD, AutoCAD, and other programs for production drafting. One of the first commercial ray tracing programs available for the Macintosh, the Dimensions family provides 3D design tools, surface shading, ray

tracing, and animations. Though well reasoned in product design and orientation, the various component programs can total $3500 and present some inconvenience because of their separation. Presenter itself does a good job of anti-aliased (smooth-edged) rendering and with the RayTrace option can produce highly realistic visuals. But other programs have appeared that offer a more integrated approach at a less prohibitive price.

StrataVision 3d 1.0.2
Strata Inc.
249 East Tabernacle, Suite 201, St. George, UT 84770, 801-628-5218.
Macintosh: II family or SE/30
Memory: 2MB RAM, hard disk
Price: $495
Copy-protected: no

With basic 3D object tools, fully implemented ray tracing and surface mapping, and importation of DXF, IGES, Super 3D, MiniCad+, PICT, and Encapsulated PostScript, this program is positioned to be the renderer of choice for almost any CAD or drawing application. Its stylized interface has a dynamic look and feel, and when it comes time to render, a small window shows a preview of the view with the effects you have chosen. Besides transparency, refraction, reflectivity, specular highlights, and shadows, there's roughness, bump mapping (for texture), diffuse reflectivity, and emissivity. Anti-aliasing and unlimited light sources of different types round out the picture. A 32-bit Color QuickDraw (System software) is required.

Sculpt 3D 1.0
BYTE by BYTE,
Arboretum Plaza II
9442 Capital of Texas Highway North, Suite 150, Austin, TX 78759, 512-343-4357.
Macintosh: II family, SE/30
Memory: 2MB RAM
Price: $1500
Copy-protected: yes

This long-awaited product has been in the works for years. Now finally shipping, it looks like all it was supposed to be. A true tri-view (top and two adjacent sides) with a three-dimensional cursor, a full complement of 3D manipulations (including Unslice, called Connect Cross Sections in Super 3D), a multitude of tool modifiers (via Shift, Option, and Command), foreground and background merging of other files, texture options with full texture mapping on the way, integrated ray tracing, and batch generation of images make this a serious environment for presentation modeling.

The interface is elegant and simple, and the data structure is 64 bit—with 32K x 32K lines of resolution! There is full support for HDTV and PRIM (Photo-Realistic Imaging, its own format) and intended support for the RenderMan (Pixar) format. Because of its exceptionally high-resolution data format, it can just as easily output to a 4K x 4K matrix film recorder as it can to a Scitex Imager or 1" tape. The developers consider themselves to be in competiton with Wavefront (high-end 3D modeling and rendering running on a Silicon Graphics or similar workstation), rather than anything currently on the Mac.

2D/3D Programs

Three-dimensional rendering is certainly exciting stuff, and any architect is bound to be mesmerized by such capabilities. But back in the realm of getting things done, many architects feel that 3D design is best put to use in conjunction with 2D drafting. After all the time and effort spent in generating a decent presentation, you have to return to the drafting board to finish the project. Why not combine the tasks?

A wealth of 2D/3D programs currently exists for the Mac. Most are general purpose CAD programs, and they all differ in the degree of sophistication they offer in 3D modeling. One of the main uses for such programs is the generation of 3D views based on an actual floor plan that can be further manipulated in other programs or by hand. We begin with the general purpose programs.

MiniCad+ 2.0
Graphsoft, Inc.,
8370 Court Ave., Suite 202, Elliott City, MD 21043, 301-461-9488.
Macintosh: any
Memory: 1MB RAM, hard disk
Price: $695, $150/$300 for plotter drivers
Copy-protected: no

At a price like this, MiniCad+ is a 2D/3D marvel, offering a Pascal-based macro language and integrated spreadsheet to boot. The look and feel are classic Mac, yet its list of CAD features is impressive. It imports and exports PICT, DXF, and text and exports Encapsulated PostScript for desktop publishing programs.

Layers limited by RAM, multiple snaps, various kinds of dimensioning, a flexible duplicate feature, fillets, trims, Bezier and cubic splines, and so on, are some of the 2D features. Objects can be extruded and swept (lathed) into the third dimension and views from all sides as well as perspective views are available. Surfaces are filled in when hidden lines are removed. The spreadsheet has functions like count and area calculation which are very handy in generating a bill of materials, and the data is updated as the drawing changes.

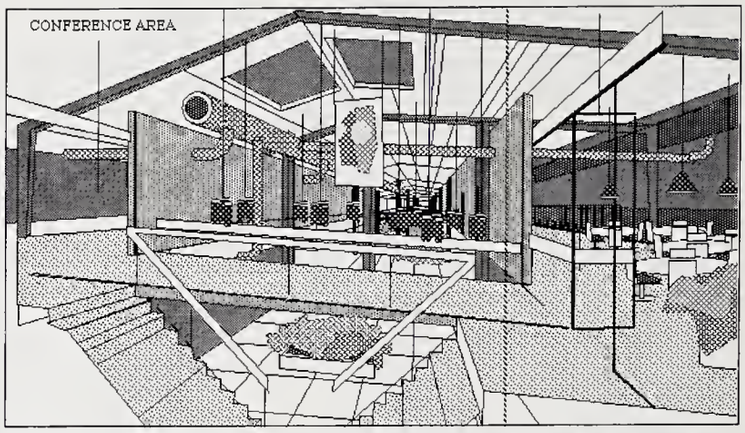
The undo feature is fairly limited, and it is not always possible to cancel an operation. But on the whole, a program like this really changes the definition of the term "basic CAD." Graphsoft is also marketing a 2D-only version of the program called Blueprint for $449.

Pegasys II 3.2.3
IGC Technology Corporation, 305 Lennon Lane
Walnut Creek, CA 94598, 415-945-7300.
Mocintosh: any (use Expert on Plus or SE)
Memory: 1MB RAM
Price: $1795
Copy-protected: no

Pegasys is an extremely well-implemented drafting program with a 3D wireframe facility. Although it can't perform hidden line removal, it does create isometric, oblique, and perspective projections as well as elevations for the kind of views that are most useful to an architect.

Many of the drafting options are packed away into dialog boxes that appear upon double-clicking any tool. The options for any given tool are thorough and powerful. For instance, double-clicking on the hatching tool reveals a wealth of vector fills that represent natural materials like Fire Brick and Spanish Tile or patterns like Honeycomb. Standard bitmap fill patterns are also supported for quick display. Similarly, you can use screen fonts or vector fonts with an offset, slant, different proportions, at an angle; after a text block is created you can save the text as a file or read text from a saved file.

Some features like filleting between other than lines and radial dimensioning are still missing (their relevance to architectural drafting may be nil, of course), but overall the thoughtfulness of the program is quite evident.



7 An interior perspective generated in Super 3D and brought back into PowerDraw, by Barry Pendergast of the Pendergast Group, for ATCO Structures, Calgary.

VersaCADll 2.1.1
VersaCAD Corporation,
2124 Main Street
Huntington Beach, CA 92648, 714-960-7720.
Mocintosh: any
Memory: 2MB RAM on II, 1 MB on Plus or SE, hard disk
Price: $1995
Copy-protected: no

The first major DOS-based CAD program to be effectively re-written for the Mac environment, VersaCAD established a viable alternative to PC-based CAD. VersaCAD has been in existence longer than AutoCAD, and the two programs on the PC are comparable in capability. The Mac field has since become rather crowded, but VersaCAD continues to present its competiton with a formidable set of drafting features, including fillets between arcs, circles and lines; calculation of cross-section properties about x-y axis and center of gravity; array duplication; and so on. The menus and interface seem deceptively simple, since many palettes can be shown or hidden for groups of functions like snap/constraint and dimensioning. The 2D module can generate a 2-1/2D isometric view.

The 3D module is separate and extrudes and sweeps 2D shapes for isometric and perspective views with hidden surfaces or shading. Though not as convenient as integrated programs, it's quite possible to switch between 2D and 3D via MultiFinder.

VersaCAD also makes extensive use of HyperCard stacks for generating a bill of materials, providing help, and other functions. In its tradition of setting precedent on new platforms, VersaCAD/386 has, incidentally, appeared to take advantage of that processor's superior performance.

AutoCAD Release 10
Autodesk, Inc.,
2320 Marinship Way, Sausalito, CA 94965, 415-332-2344.
Macintosh: II family
Memory: 4MB RAM, hard disk
Price: $3000
Copy-protected: no (international version, yes)

One of the grand-daddies of CAD software on the PC, AutoCAD is blessed by fanatical adherents and cursed by almost everyone else. Even on the Mac it creates its own comprehensive environment, to the extent that the watch or spinning circle is replaced by a spinning Autodesk logo. In release 10, 3D modeling is now supported, and AutoLISP provides an extensive macro programming capability. Three-dimensional wireframes can be viewed in the main program and must be surface rendered in AutoShade. The AEC Architectural template and AutoShade are not included in the Mac version, although they are included in the DOS version.

In its authoritative way, Autodesk has paid careful attention to the Mac interface and, as seen fit, has improved on it. The Apple, File, and Edit menus are not programmable and cannot be invoked by a macro. Cut, Copy, Paste, and Clear are not active in AutoCAD and are provided for the benefit of desk accessories. A fourth menu unique to the Mac version, AutoCAD Utilities, becomes active when no file is open and allows configuring of the program, among other things (it's better than going back to DOS). All other menus are tear-off menus that can be configured to show icon or command only, and advanced users can customize these menus and create custom menus.

All this says very little about the raw capabilities of AutoCAD, but that's because everyone knows how significant they are. There is a facility to do just about everything you need to do, although some operations involved in architectural design are probably easier in other programs. One thing I can personally attest to is that the Mac version, for all its basic similarity to the DOS version, somehow seemed easier to use. The very fact that AutoCAD can be ported so completely to the Mac says a lot for the one-button mouse and pull-down menus.

MicroStation Mac 3.5
Intergraph Corporation,
One Madison Industrial Park, Huntsville, AL 35807-4201, 215-524-9800.
Mocintosh: II family; SE/30
Memory: 2MB RAM, hard disk
Price: $3300
Copy-protected: yes

A fuller implementation of the Intergraph workstation than Snap!, MicroStation

turns the beast into a fairly accessible program in the friendly Mac environment. The User's Guide makes no assumptions about the user's prior knowledge and proceeds tutorial-style through a series of basic exercises. As in Snap!, users can access multiple reference files that help coordinate inter-departmental work, and template files with specific settings are saved as seed files. Wireframe modeling and surface shading are available from within the program. Like AutoCAD, this general-purpose workhorse can perform just about any task, but a specific task like drawing multi-line outlines is a multiple-step operation.

Planit 1.3

Planit West.
1670 F Las Plumas, San Jose, CA 95133, 408-279-6862.
Macintosh: any
Memory: 1MB RAM
Price: $3995
Copy-protected: no

A highly specialized solution for the planning and construction of kitchen cabinets, Planit integrates customer reports with 2D design and manufacturers' product databases to optimize kitchen design. It can generate multiple views with hatched surfaces, including a perspective view. The 2D design seems a bit clumsy, although windows and doors can be inserted with relative ease.

MacSurf 4.0

Chance & Co., Inc.,
Pratt Street, Essex, CT 06426, 203-767-2161.
Macintosh: any
Memory: 1MB RAM
Price: $900 for single surface, $4500 for 16 surface
Copy-protected: yes

A comprehensive solution for naval architects as well as aeronautical and automotive designers, the MacSurf family of 3D design and add-on modules offers mainframe capabilities on the Mac. MacSurf features surface modeling based on B-splines optimized for streamlined shapes. Built-in hydrostatic calculations, large angle stability, continuous on-screen dimensioning, and many other specialized features allow the designer to explore design parameters quickly.

Through DXF and IGES file transfer, designs can be exported to 2D drafting packages for final production drafting.

A Moment, Please

The final two programs in our survey are unique in their dedicated architectural approach. Interestingly enough, they epitomize the two alternative methods of 3D design. Architrion is segmented into Design, Draw, and List modules, and the Design module is based on true volumetric solid modeling. ArchiCAD integrates 2D drafting and 3D visualization in one seamless interface. It too features true solid modeling but operates more in the sense of defining a 3D model from a 2D plan. The key here is that the 2D plan is in fact the basis of the final plan. Because of their comprehensive nature, both products aspire to provide a complete presentation and design modeling solution. What this means to an architect's working procedure will now be explored. Both programs also employ a hardware key, known as a dongle, that attaches to the SCSI port.

Architrion II Series 5

Gimeor, Inc.,
420 10th Street S.E., Washington D.C. 20003, 202-223-4373.
Macintosh: II family, SE/30
Memory: 2MB RAM, hard disk
Price: $3400, $295/yr for support
Copy-protected: yes

The 3D module is based on the principle that architects begin the design process in 3D and would prefer to implement a design in that mode. The basic element of construction is the block, types of which can be predefined in a scrollable library. Hence, one tool encompasses walls, slabs, roofs, and any other kind of 3D construction element. Holes and windows or doors can be added (or, in the case of holes, subtracted) with other tools. Window and door placement in this program as well as in ArchiCAD is extremely convenient and based on library elements with distinct characteristics.

Despite the pervasive volumetric nature of the Design module, most drawing has to be done in plan view, although wireframe axonometric views (like isometric or 30-60° parallel-edge projections) can be quickly modified and referenced for visualization purposes. Sections and section elevations can also be generated. The rendering possibilities in ArchiDesign are fairly elaborate and include highly realistic light sources like the position of the sun at the chosen longitude, latitude, and time; full surface shading; and cast shadows. These views fall under the category of Special Views and take a considerable amount of time to generate. A feature called Sequenced Views allows the user to set up multiple viewpoints in 3D space as key frames that can be generated in batch fashion. This means that complex and lengthy walk-through (or fly-through) sequences can be set up to be rendered overnight. In the morning, a separate utility called Action! allows you to string together the various renderings in a bona fide animation.

While Gimeor claims that its is the only true 3D solid modeling program on the market, the real issue is how effective its solution is in joining presentation and design modeling with 2D drafting. The Draw module is thorough but has the same stylized interface. A French product, Architrion definitely bears the stamp of a style-conscious creator. Its many stylized icons cater to its visually oriented audience, but at the sacrifice of a steep learning curve (a command window is badly needed, in the opinion of this reviewer). If its interface is any indication of its intention, it would seem that Architrion is striving to be the ultimate architectural solution, and is assuming that any user would be as dedicated to it as it is to architecture. Despite its segmented nature, Architrion does pack a powerful punch and shares a good portion of the "do-it-all-here" limelight.

ArchiCAD 3.4

Graphisoft,
400 Oyster Point Blvd., Suite 517A, So. San Francisco, CA 94080, 800-344-3468.
Macintosh: II family, SE/30
Memory: 2MB RAM, hard disk
Price: $3950
Copy-protected: yes

Somewhat more soft-spoken and straightforward, this Hungarian product was designed exclusively for the Macintosh based on the design specifications of an Italian architectural firm. The interface is so thoroughly Mac-like, it's disarming.

This program takes the notion of a drawing application on the Mac to its logical, applied end. Back when some of us thought it was strange that MacDraw had so many odd fill patterns (oh, except that they could stand for concrete and brick), the idea was born that simple drawings on the computer might have some correlation with reality. Here, pick a tool and draw a line—only it's really a wall, with wall-like parameters that can be seen in a quick 3D view. Pick another tool and insert a window that stays with the wall through modifications and offers a see-through opening. (Holes can be punched in walls by inserting blank windows and doors of various shapes.) Pick another tool and draw a polygon—only it's a slab that is automatically fitted underneath the walls. Roofs are also polygons that can be drawn in two general ways. Add furniture with another tool, and create custom 3D descriptions of drawn symbols with the native GDL programming language. Holes can be inserted in roofs and slabs by drawing another polygon within them. If you hadn't read about the other programs described so far, you wouldn't realize what a feat this kind of simplicity represents.

In ArchiCAD, 3D views include an option for surface or solid modeling; wireframe, hidden line, surface shading and shading with contour; plan elevations, obliques, isometric and other axos, and perspective; rotations and other transformations of the model in 3D space; movable light source, target, and viewer position. Like Architrion, interior perspectives are possible. Multiple arbitrary section planes enable you to view any section elevation with the above options.

ArchiCAD proceeds on the basis that architects are accustomed to drawing in 2D and that 3D visualizations can aid the process of generating a plan. Various features optimize the drafting process, including associative dimensioning; smooth clean-up of wall junctions; extensive furniture, fixture, window, and door libraries; and so on. Some 3D views can serve as the basis for presentations, but the highest quality rendering of complex designs can take hours. Bill of materials generation with cost estimation is available on line, which is especially useful for designing within known limits and generating accurate estimates for clients. (Architrion has a seprate List module for the same purpose.) You can save 2D drawing files of 3D views and finish them up within ArchiCAD or in rendering programs.

PlotMaker, a stand-alone plotter driver and layout utility, comes free with the program.

The two programs described above are excellent examples of what can happen when a Mac is put to dedicated architectural use. Both are popular in Europe and are gaining ground here. Architrion encourages volumetric design and generates sharp presentation views; ArchiCAD aids the traditional working style of most architects and provides easy 3D visualizations as well as more refined presentation images. Both require that the basic drawing process occur on a 2D plane. To Architrion this is an almost incidental but handy fact (for further elaboration of the plan in the Draw module); ArchiCAD uses this to its advantage. Both are highly attractive ways of achieving the same end.

Conclusion

Younger and older members of the field of architecture are beginning to work and think differently. We may see a generation of architects that can think and work more freely in 3D due to the availability of visualization tools. Some of the tedium of drafting can now be reduced significantly by higher-end programs that will generate multiple views based on the same plan. Various tools can be used in combination to handle the various tasks of design, presentation, and production drafting. The order and combination of these tasks we may begin to follow the actual creative process more closely.

The two-headed beast mentioned at the beginning of this article, however, lurks among all of us. When looking at technology, we often look first at the glamour, glitz, and gleam, and may attempt to put tools to inappropriate use, or conform our work to the tools available. For most personal computer enthusiasts, sinking $10 thousand to $15 thousand into a new tool certainly makes you wish you could do something you could never do before, faster and better.

And you can. We are getting nearer to a complete architectural model in one file structure, but only through a two-way understanding of the entire architectural design process and the advances of hardware and software.

*Phil Inje Chang is a writer, a designer, a consultant for Macintosh graphics, and the publisher/editor of the soon-to-be-released, all-new **Shades of Gray**, a bi-magazine of fine art and desktop design. "Real World CAD" will be an ongoing feature in the desktop design half of the new **Shades of Gray**.*

from page 25

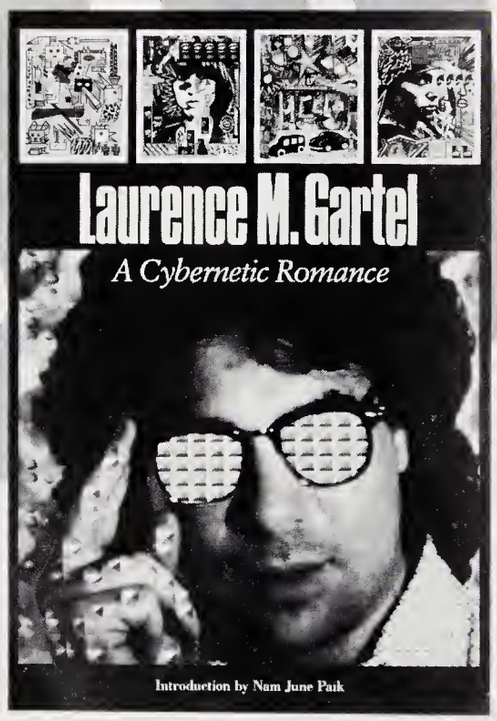
LabelWriter Printer (for the Mac)
A miniature printer that prints 1" x 2.5" labels for envelopes, file folders, floppy disks, bar codes, etc. Desk Accessory software included. $249.95. Costar, 22 Bridge St., Greenwich, CT 06830, 203-661-9700.

PaintJet XL (for the Mac)
This is a faster version of PaintJet that supports 32-bit color QuickDraw, outputting 16.7 million colors when the computer contains a video adapter that supports 24-bit color. Includes 13 LaserWriter matching outline fonts that can be scaled from 6 to 250 points. $2495. Hewlett Packard, 100 Mayfield Ave., Mountain View, CA 94043, 800-752-0900.

Postscript Cartridge for LaserJet IID (for the IBM)
Official Adobe interpreter contained in a cartridge brings PostScript to the HP LaserJet IID printer. Fits into existing slots. $995. Adobe Systems Inc., 1585 Charleston Rd., P.O.B. 7900, Mountain View, CA 94039-7900, 415-961-4400.

PUBLICATIONS

Laurence M. Gartel: A Cybernetic Romance by Laurance Gartel with an introduction by Nam June Paik. A large-format, full-color book featuring a comprehensive retrospective of Gartel's computer art, spanning 14 years. It includes works from high-end and pc-level systems. Gartel, an instructor at the School of Visual Arts computer art lab in New York City, was one of the early pioneers in computer art, and has had gallery showings in several countries. He was influenced by video artist Nam June Paik, which accounts for his emphasis on manipulation of digitized video images. $14.95. Gibbs M. Smith Publishers, P.O.B. 667, Layton, UT 84041, 801-544-9800.



Publish by Design (for the IBM)
A computer-based training program and reference tool for desktop publishing has been introduced by Online Computer Systems Inc. The program teaches users the proper methods and procedures of desktop publishing and supports such leading desktop publishing programs as Aldus PageMaker and Xerox Ventura Publisher. It is ideal for those who are not skilled in basic composition, design, and print production concepts and techniques. Tutorial information on such topics as page layout, line leading, point size, fonts, inserting visuals into text, copyfitting, and more is presented. $149.95. Online Computer Systems Inc., 20251 Century Blvd., Germantown, MD 20874, 301-428-3700.

MacPrePess (for the Mac)
A weekly four-page FAX letter reporting on the cutting edge of Mac-based off-the-shelf prepress technology. Charter subscription price, $250. PrePress Information Service, 12 Burr Rd., Westport, CT 06680, 203-227-2357 or 215-543-5194. Also contact publishers Kathleen Tinkel or Steve Hannaford at MCI Mail: KTINKEL or SHANNAFORD.

STILL VIDEO

Xapshot (for the Mac)
A hand-held digital camera that uses 2-inch video floppies to record analog video still images that can be converted to digital images using a standard video digitizing board, and can be saved as color TIFF or PICT files. $999. Canon USA, Jericho Plaza, Jericho, NY 11753, 516-933-6300.

THREE-D GRAPHICS

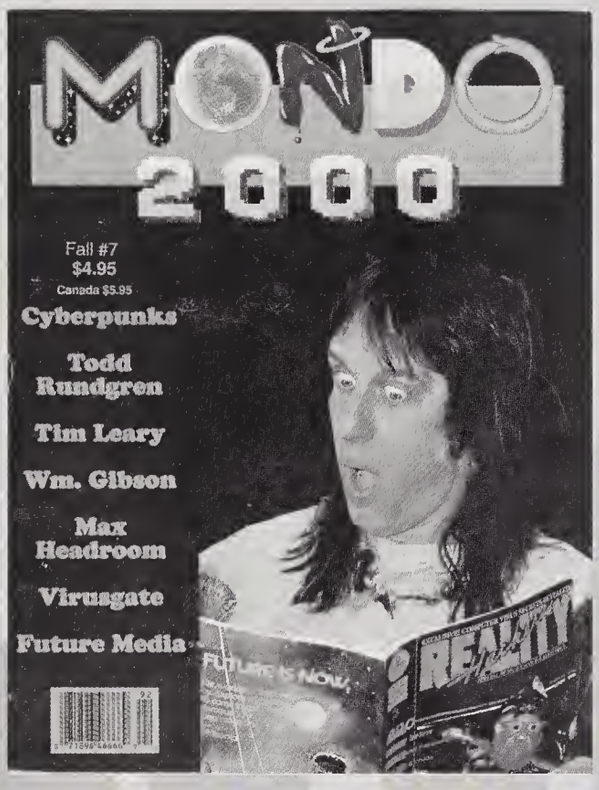
Sculpt 3D (for the Mac)
Features include unlimited light sources; full image ray tracing; phong and smoothing; 32-bit color support; HDTV aspect ratio support; variable output resolution (up to 4096 x 4096 pixels); import and export options. Does not provide animation. $1500. Byte by Byte, 9442 Capital of Texas Highway North #150, Austin, TX 78759, 512-343-4357.

StrataVISION 3d (for the Mac)
A 3D modeling program that comes complete with tools for texturing and detailed rendering. Rendering algorithms include flash80, ray tracing, phong, and wireframe. No animation. $495. Strata, Inc., 249 East Tabernacle, Suite 201, St. George, UT 84770, 800-869-6855 x300.

NeXT UPDATE

October was the official release month for the NeXT computer's revolutionary 1.0 operating system. Businessland and NeXT teamed up to officially roll out the NeXT computer workstation to the public and the business community. Businessland has already purchased $100 million worth of machines and has the exclusive rights for U.S. distribution. Meanwhile, Canon has also purchased $100 million worth and has exclusive rights for Asia. More importantly, IBM has spent somewhere between $10 and $50 million to license the NeXT Step interface.

NeXT brings a wealth of new powers and features to desktop publishing with substantial cost savings. This level of power was previously available only in high-end workstations like SUN, HP, and DEC. For example, FrameMaker, a leading workstation page-layout software program, sells for anywhere from $10,000 to $20,000 for SUN or HP. FrameMaker is available today on NeXT for under $1000.



Mondo 2000 (formerly ***Reality Hackers***) (for pc's)
A behemoth of a 90s magazine melding pc technology, consciousness expansion, and the Berkeley spirit of revolution! $24 for six issues, $4.95 for single issues. Mondo 2000, P.O.B. 10171, Berkeley, CA 94704, 415-845-9018.

Here is a list of third-party software and hardware available today:

FrameMaker 2.0 *(Frame Technology Inc.): page layout with PostScript illustration tools.*

Digital Ears *(Metaresearch, Inc.): direct-to-disk digital stereo CD recorder.*

Video Monitor and Projector Interfaces *(Extron Electronics): for projecting the screen.*

A/D64x Analog/Digital Interface *(Singular Solutions): high resolution A to D converter.*

TextArt *(Stone Design Corporation): PostScript text tool.*

Here is what's coming very soon:

Workstation Publishing Graphics
Adobe Illustrator *(Adobe Systems Inc.): imagine what it is like with a PostScript screen.*

Adobe Type Library *(Adobe Systems Inc.): 500 different type faces.*

Smart Art *(Emerald City Software, Inc.): contains 50 text and graphic effects.*

Artisan *(Media Logic Inc.): high-resolution paint and image processing.*

Top Draw *(Media Logic Inc.): object-oriented drawing tools.*

Encapsulated PostScript Click Art *(T/Maker Inc.): 400 EPS illustrations.*

Cad
Dreams *(Innovative Data Designs, Inc.): power precision drawing and drafting tools.*

Music
Performer *(Mark of the Unicorn, Inc.): MIDI sequencer software.*
CODA Music Software: music notation software.

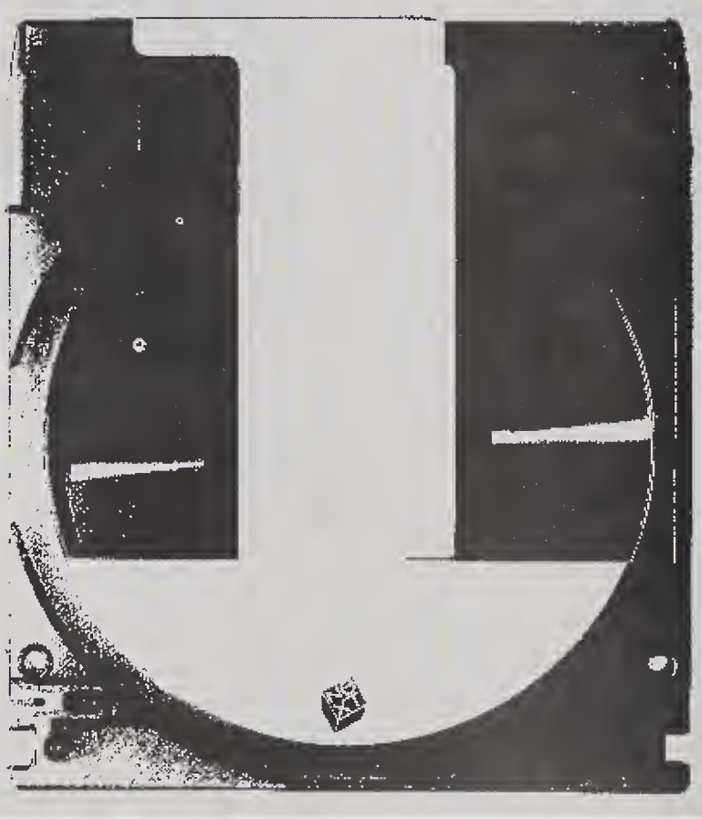
Multimedia and Hypertext
Xanadu Hypermedia information server *(Xanadu Operating CO.): manages multimedia.*

MediaStation *(Imagine, Inc.): archives, retrieves, and processes multimedia information.*

Within a year we expect to see:
True 32-bit color PostScript (16.8 million colors) display for the NeXT. This will arrive just about the same time some really hot color input and output devices start to pop up in the market.

You can see the NeXT machine at any Businessland store. Verbum will cover the art and multimedia capabilities of the "Cube" in issue 4.2 next year.

—Nicholas Mac Connell



NEOMEDIA

■ by David C. Traub

***Verbum** is pleased to introduce "Neomedia," a regular column in which Multimedia Editor David Traub will report on new media technology and products.*

Perhaps barcode readers for books have been around for several years. I hadn't seen them until yesterday. Imagine sitting in the classroom, videodisc primed, waiting for the sociology professor to find that book.

When she returns, she opens her book, commences her lecture on contemporary advertising, and just as the words become a nebulous blur, she deftly lifts what looks like a magic wand and runs it over her place in the text. Across the room the videodisc hears the infrared signal sent by the wand and hums into gear, bringing to life a stunning Ridley Scott commercial that portrays today's bloom of global empathy. Note that in this scenario nothing happens without the book—a refreshing observation for these sometimes jaded, yet early days of multimedia technology on pc's.

How It Works

The concept is simple. While outlining her speech (on any of the major MS-DOS word processors, such as Word Star, Multimate, or Microsoft Word), she comes to the section where the class might benefit from a quick jolt. She strikes the hot keys "Alt-V" and up comes Pioneer's "Laser Barcode Toolkit" TSR (Terminate and Stay Resident Program). A request forms on-screen asking if she wants to select "Player Control," "Create Barcode," or "Rehearse Barcode."

Picking the first, she is able to drive and review the videodisc containing Scott's demo reel to locate the on-disk images or video clip she wants to show the class. She reviews the clip she has chosen, noting its in and out points (first and last frame numbers). Next she selects "Create Barcode," which provides options asking (1) the type of event she wants to program (play, forward, reverse, etc.); (2) the parameters of that event (in and out points; two, one, or zero audio tracks, which are especially useful for bilingual products, etc.); (3) which option for printing the barcode she might choose (inserting it within a word-processed document or directly upon adhesive labels); and (4) whether or not she would like an additional opportunity to rehearse her choice. Having selected the video clip, she enters the in and out points, selects her audio, and then rehearses the clip. Finally, she selects Insert from among the Print options, causing an injection code to be placed in the appropriate space in the evolving document that will later tell any dot matrix printer to insert a bit-mapped barcode image as the rest of the document takes form (a special software utility can be purchased to enable PostScript printing within Ventura).

She might also have selected the option "Label," instead of "Insert," which would have bypassed the document in RAM and sent the barcode directly to a printer prepared with adhesive labels. In this case the end result is a sticky label the creator can place in any textbook, on album covers or separate lecture notes, or upon any surface from which the user may choose to conduct his or her control of a videodisc player.

The Players

This vision of the wand-armed professor leading a class, or of the distant learner seated before a barcode-enabled workstation at home or at the office, has become a driving force in positioning some of the largest publishers in educational media firmly behind the videodisc.

For example, Encyclopaedia Britannica Educational Corporation (EBEC) is transcribing more than 100 of its videotapes from series such as "The Great American Series" and the "Heritage In Black Series" onto videodiscs. Optical Data Corporation (ODC) is publishing barcoded supplements to support its "Living Textbook Series," as well as facilitating the same for the three ABC interactive videodiscs it distributes ("'88 Vote," "The Holy Land," and "Martin Luther King"). AIMS Media is converting over 100 of its videotape titles into videodisc products for barcode-directed access. Other multimedia players such as Apple Computer, McGraw-Hill, and Harper and Row are also directing barcode publishing projects.

While the impending deluge of multimedia materials represents obvious potential advantages to the end-user, the benefit of this new direction in publishing to the media and textbook publishers is enormous. Existing textbooks can now be enhanced via barcode to provide a fuller presentation, thus improving their chances for adoption. The teacher comes to recognize multimedia publishers as leaders in educational innovation, looking to them for future textbooks. Videotape publishers realize additional life for their products by repositioning them as videodiscs. Videodisc publishers can sell their libraries to far larger audiences as the barcode increases both the videodisc's perceived value and its accessibility. And as these libraries encourage an easy integration of videodisc players into educational technology, even among managers who have traditionally feared—and thus, denied their staffs access to—interactive technologies such as videodisc and computers, we will see a much greater market for new disks.

The Main Player

Of course, the greatest immediate beneficiary of barcode technology is the current holder of its licenses, the Pioneer Corporation. While barcode readers were developed in the mid-1980s and licensed to entities such as National Educational Corporation, the National Library of Medicine, and Perceptronics, and while some of the resultant applications were quite noteworthy (especially Perceptronics' pc and barcode-enabled "Action Code" videodisc series, which won one of the University of Nebraska's 1987 "NEBI" awards), nearly all of the projects were one-off (single-copy) applications for specific end-users, and none served to successfully introduce the technology to mass markets. Pioneer, which holds the majority of the videodisc market, saw in barcode technology an opportunity to catalyze lagging videodisc sales.

In 1987 Pioneer purchased all licenses worldwide to videodisc barcode technology, and proceeded to rework both hardware and software to create low-cost, user-friendly products that would appeal to a wide base of users. In 1988 Pioneer introduced the product to the Japanese market, establishing its file format as standard for most of the major electronic hardware

and publishing firms. In January of 1989, Pioneer introduced its low-cost turnkey "Barcode Toolkit" to the United States, providing compatibility with both its LD-V2000 and LD-V2200 videodisc players.

At a cost of less than $900 for either player, $130 for the infrared wand, and $250 for the MS-DOS generation software, a user is able to purchase a videodisc and a barcode toolkit to create multimedia references. Nearly any dot matrix printer will do.

Pioneer is also coming out with a $180 adapter that will convert not only the LD-V4200, LD-V6000A, and LD-V8000 series videodiscs to barcode compatibility, but also their LC-V 330 72-disk dual-headed videodisc autochanger, which provides access to nearly 8 million addressable video frames from a single encoded book or surface—a lot of reading for a rainy day.

The Near Future

Most of the bar-coding available today comes pre-encoded on videodisc album covers and print supplements. This offers an easy introduction to users new or averse to the concepts of interactivity, computers, and multimedia. While more and more textbooks will be adapted to include barcode references as standard, it's likely that the user-generated "labeling" approach will gain a much larger share of the market as teachers learn how to "retool" their texts. As the cost of one-off videodisc masters becomes lower (currently it's about $200), teachers will increasingly spend their summers gathering slides, overheads, and video clips to serve as a lecture resource for multiple classrooms during the year.

We also will see barcodes used in other ways in classrooms. In mid-January 1990 we should see barcode software that works with word processors for the Apple II. The Macintosh version won't be far behind, most likely appearing as an extension to existing videodisc drivers written for HyperCard.

Moreover, increasingly, barcode technology will be integrated with pc software as yet another input device. And as video compression technology improves its performance over networks, we'll eventually see multiple users with multiple monitors reading diverse images from a single source, drawing upon one image in a buffer as another is called from a different node. This last scenario might materialize as part of some collaborative, even competitive gaming context in which speed and teamwork determine who draws first.

Certainly home education will make use of barcode technology. Panasonic has for years been developing a barcode reader to program a VCR for delayed playing from the couch via an encoded TV guide. Pioneer and others still picture a bright future for the consumer videodisc (combi players for CDDA, 8-inch, and 12-inch videodiscs). Envision children cheerfully driving their interactive television/telephone receivers from pre-encoded coloring books—or even from their high-tech "Etch-a-Sketch." Imagine endless loops of Mr. Rogers' "Its A Beautiful Day in the Neighborhood"!

The Wrap

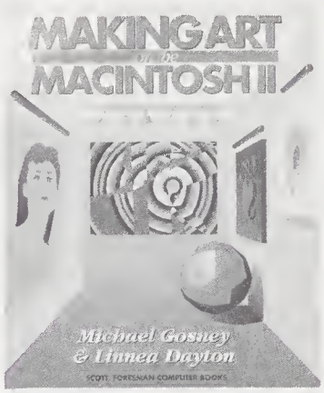
Today the significant aspect of embedded barcoding is its ability to remove the computer from the loop, providing teachers the ability to drive a videodisc directly from a book. This means teachers who are fearful of computers, or unsure of how to integrate these technologies into their teaching mix with minimal training and preparation, can begin to deploy the videodisc to their advantage in a simple and logical manner. When applications developers learn how to combine computer and videodisc technology, we'll begin to see the types of technological, curricular, and cultural integrations we in the computer industry have hoped to facilitate for a long time. In this partnership, computers will be used for program structure, interface, and branching. Books will help students interface with the technology, providing portability, distribution of the technology to a wide audience, and—eventually—the ability to use the new technology either at home or at school.

Pioneer Laser Barcode Reader for use with computer-generated barcodes positioned on text pages, which can trigger videodisc presentations.

COURTESY PIONEER CORPORATION

Multimedia technology is not some futuristic wish; it's a contemporary fact. This article has discussed what can be done today. Multimedia technology is being adopted—and adapted—by publishers at a mind-boggling pace. With the integration of hundreds of new barcoded book and videodisc titles into the multimedia loop by credible publishers like Britannica, ODC, and AIMS Media, it won't be long before teachers come to appreciate how technology can help them capture the interest of their students. And not only capture their interest but motivate them as well!

Students will look forward to learning—and especially reading—because of the new-found dexterity the book will offer through its ability to become a multimedia reference if the user so requests. Today those of us who work in multimedia at last have credibility and the opportunity to prove multimedia's legitimacy as a truly evolutionary tool for education and entertainment—in both classrooms and homes. Imagine.



IF YOU HAVE A MAC II (OR PLAN TO GET ONE) YOU NEED THIS BOOK

"A much needed book that explains to artists how they can harness the Mac to amplify their creative powers. The book is loaded with useful tips and thoughtful product comparisons that will help artists get the most out of their Macintosh investment."
– Frederick E. Davis, Editor-in-Chief, *MacUser*

"Making Art on the Macintosh II *is one of the few books which goes beyond re-writing program documentation and offers true value. It's one of the few computer books I've ever sat down and read cover to cover."*
– Roger C. Parker, Author, *Looking Good in Print: A Guide to Basic Design for Desktop Publishing;* creator of *Desktop Design Seminar* series

"I don't know how Gosney and Dayton have managed to keep up the pace, but they have, and herein guide us through this new digital wonderland with artist's vision and lots of end-user common sense. Thanks."
– Michael Green, author/artist, *Zen and the Art of the Macintosh*

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The Pixel-Paint Art Contest

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ART SUBMISSIONS Send creative works with a 100-word explanation of the process used (including hardware and software used) and a 50-word biography, on disk and on paper (Macintosh format preferred, MS Word or MacWrite for text files). If work involves combined media, photostats, photos, or transparencies are welcomed. Please include a self-addressed, stamped envelope for return of the materials. Send to *Verbum* Art Editor.

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VERBUM BACK ISSUES

1.1 Early 1987 The first Verbum, all black-and-white, 300 dpi laser output, beautifully printed on 70 lb. Sequoia Matte. This epic launch of the Verbum journal, designed with PageMaker 1.2 by John Odam, inspired designers worldwide. • Featured artists: Avant-garde concept artist Paul Rutkovsky with redigitized illustrations, Mike Swartzbeck's trailblazing composite illustrations from scanned images, excerpts from David Brunn's Irish Book of Invasion using innovative digital photography techniques. • Columns: Michael Singleton's The Artist's Toolbox offers a primer on bitmapped graphics with a feature-by-feature comparison of leading programs. Behind the Scenes by Kim Criswell responds to the state of the industry circa January, 1987 with "Big World, MacWorld." "Painting by Numbers" by Tony Smith introduces the PostScript page description language. John Odam's "First Contact" takes Fontographer through its paces.

1.2 Mid-1987 This issue was produced with ReadySetGo! 3, 1270 dpi Lino imagesetter output, and digital color separations. • Features: "Amiga Video" looks at the unfolding possibilities of the animated Amiga. "Painting as Spiritual Discipline" by Jack Oavis shares the artist's experiences with Japan's elegant painting program, Mac Calligraphy. "Big Blue Art" by Mike Kelly profiles the world of IBM graphics from the Verbum point of view. "Lino Seps" by Mike Saenz explores the new wave of digital color separation, featuring Marvel Comics' new Iron Man cover created by Saenz. "Digital Studies" by Australian Mac-artist Malcolm Thain captures the grace of passive and active female forms. • The usual "Gallery" of unusually inspired pieces. • Columns: The Artist's Toolbox compares PostScript illustration programs Adobe Illustrator and CricketDraw as well as two font editors and four special effects programs. "Desktop Techniques" by John Baxter looks at parallels between low- and high-tech graphics tools.

1.3 Late 1987 The third Verbum was produced with PageMaker 2.0. More pages, more color, a very dense issue, the first to be sold in quantity on the newsstands. • Features: April Greiman's "Pacific Wave" sculpture/exhibit in Venice, Italy. "Desktop Video." "Continuum" by Linnea Dayton explores the future of Verbum. Dominique de Bardonneche- Berglund, Europe's digital painter of renown. Jack Davis explores ImageStudio. "Creative Waveforms" by Neal Fox focuses on music. • Columns: Tony Smith on 3-D with PostScript. The Artist's Toolbox compares object-oriented programs on the Mac. John Odam's First Contact treats Adobe Illustrator, including a color piece. Behind Scenes covers people and industry news of note.

2.1 Winter/Spring 1988 The first color cover features an Illustrator 88 piece by John Odam, digitally separated. Ever more color and new columns: "Against the Grain" by Steve Hannaford offers a practical counterpoint to Verbum's creative excitement, with technical/economic guidance. "Stackware Party" by Linnea Dayton reviews artistic HyperCard stacks. • Features: Lawrence Kaplan's "Hot-Tech" prints, "The Fine Art of Dot-Matrix Printing" by Nira, "PC 3D Showcase" by Jack Davis, "Color Output Options" by Erfert Nielson. • Columns: John Odam's "First Contact" explores Aldus FreeHand with color illustrations, all digitally separated.

2.2 Summer 1988 Verbum's first cover theme is "Fashion" with a Jack Davis cover illustration done in Adobe Illustrator, and a major article on PC Fashion Design. • Other features include: Mel Ristau's Electroglyphs" - iconic PostScript illustrations, "Georgeanne Deen's Rock and Roll on Amiga," "Sound Sampling Sensation" by Neal Fox and a how-to on shooting slides off your high-resolution monitor. • Columns: "Against the Grain" gets the "bottom lino" of the imagesetting business; "First Contact" treats Illustrator 88.

SOLD OUT

2.3 Fall 1988 "Space" concept issue features a survey of Architectural CADD apps on the Mac and IBM-pc, with a "Living Space" gallery in kind. Space theme is also followed with an "Outer Space" gallery of cosmic visions by Ron Cobb and William Lombardo. The regular ("Art Space") gallery features landmark PixelPaint works by Dominique De Bardonneche-Berglund, Bert Monroy and Ikeda Tomoyo, digitally separated with PixelPaint 2.0. Nicholas Mac Connell and Linnea Dayton travel to Inner Space with "Through the Silicon Looking Glass," an exploration of pcs as mind machines. • Columns: John Odam experiments with PixelPaint (all digital seps). Against the Grain takes a hard look at digital color seps.

3.1 Winter 1989 Special issue on "The Word" explores writing, editing, publishing and typography, with Jack Oavis' "Initial FX" on special effect initial caps, Mike Kelly's "Grammar and Style Checkers," a parody on "Third-Generation Software for Writers" by Michael Rossman and the first Verbum interview with the intellectual program Racter. • The Gallery features image-laden poetry and poetic images. • Columns: John Odam's "First Contact" takes a second look at Fontographer and font design. Steve Hannaford covers the font explosion and industry trends for typography.

3.2 Spring 1989 "4D" issue focuses on move-ment in pc art: Animation, MIDI-Laser Performance Art, The Telemorphic Future, HyperAnimation, Interactive Artistry • Verbum Interview with Todd Rundgren and David Levine. Look and Feel makes a "Reality Check." Against the Grain tackles Multimedia. New Frontier Products emphasizes 4D • The "HyperGallery" features HyperCard art and the "4D Gallery" showcases video visions • Like the previous two issues, 3.2 includes many digital color separations and was produced with PageMaker 3.01

3.3 Summer 1989 "Lifestyle" theme issue features include: Brenda Laurel's essay "On Dramatic Interaction," a definitive study of virtual reality and the dramatic arts; Janet Ashford reflects on her lifestyle with the Mac in "Should I Kick It?"; Update on "Computer-Aided Fashion Design"; Russel Sipe's overview of hot computer games; Mark Stephen Pierce's "Making Fun" shares the experiences of a pc game designer. • Columns: Against the Grain treats Telecom. Look and Feel covers health issues for pc users. The Gallery emphasizes human forms and bitmapped illustrations. New Frontier Products showcases lifestyle enhancements as well as regular product news.

PRODUCTS

Verbum Digital Type Poster Designed by Jack Oavis and Susan Merritt, this deluxe five-color, 17" x 22" poster showcases the variety of digital type effects possible on the Macintosh. It was produced on a Mac II with PageMaker 3.0, output on a Linotronic L-300 and printed on a 100 lb. coated sheet. The text explains the history of initial caps in publishing, and how each sample letter was created. A framable "illuminated manuscript" for every electronic design studio. Limited edition of 2000. Shipped in capped tube. $10.00 postpaid.

Verbum Stack 1.5 1989 update of the seed of a hypermedia journal. Packed with art, it has received rave reviews for design innovation. All registered owners will receive notice of the first module, which will contain a PC Art Resources database, the Hypergallery of innovative creative works and other trailblazing features. $10.00 postpaid (registered owners send $4.00 for update).

Making Art on the Macintosh II by Michael Gosney and Linnea Dayton. Written by the editors of Verbum, this book is the comprehensive reference for graphics on the Mac II. All major software and hardware products are covered. Processes are described and shown with extensive galleries of creative works from top artists and designers. The book features a 16-page color signature packed with inspiring art samples and informative captions. An invaluable guide for all Mac owners. 336 pages, $22.95 (plus $4.00 shipping/handling).

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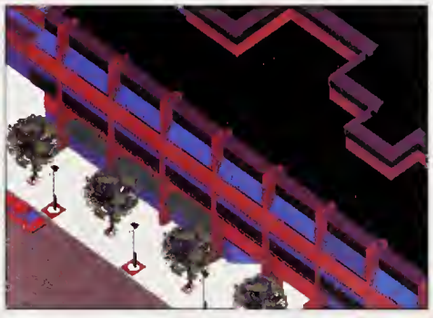

The Pentagast Group, Calgary

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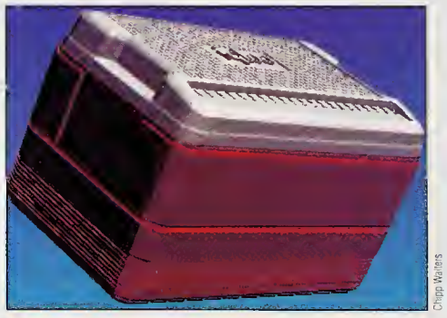

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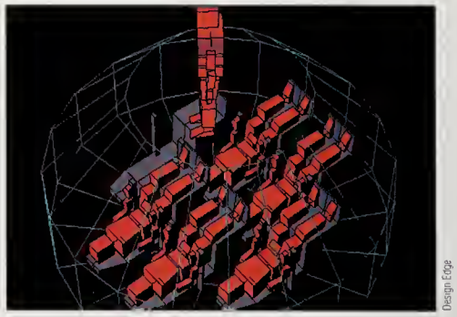
Product Design: Super 3D's realistic rendering techniques permit fast and accurate modeling of new product designs.



Design Edge

Scientific/Engineering: This design of the rescue vehicle for NASA's Space Shuttle was "tested" using an animated simulation created in Super 3D.

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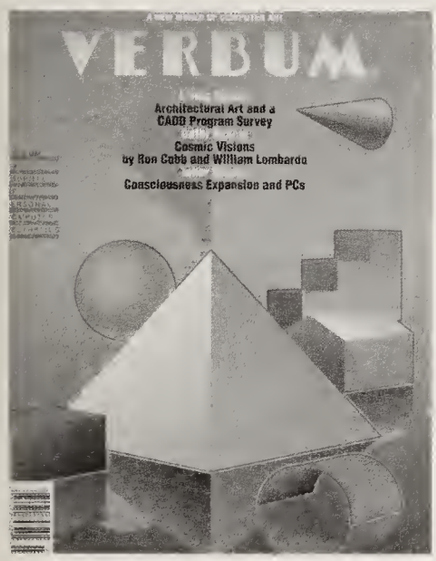

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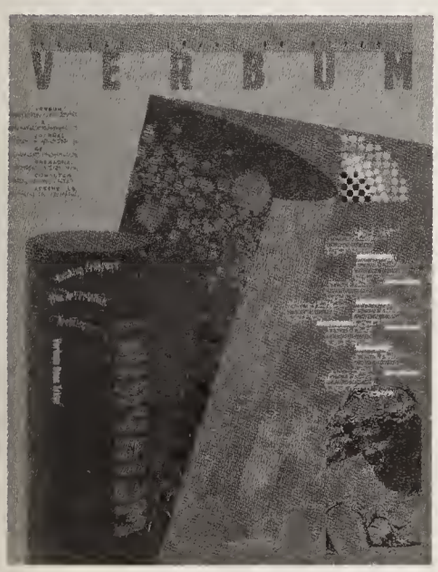

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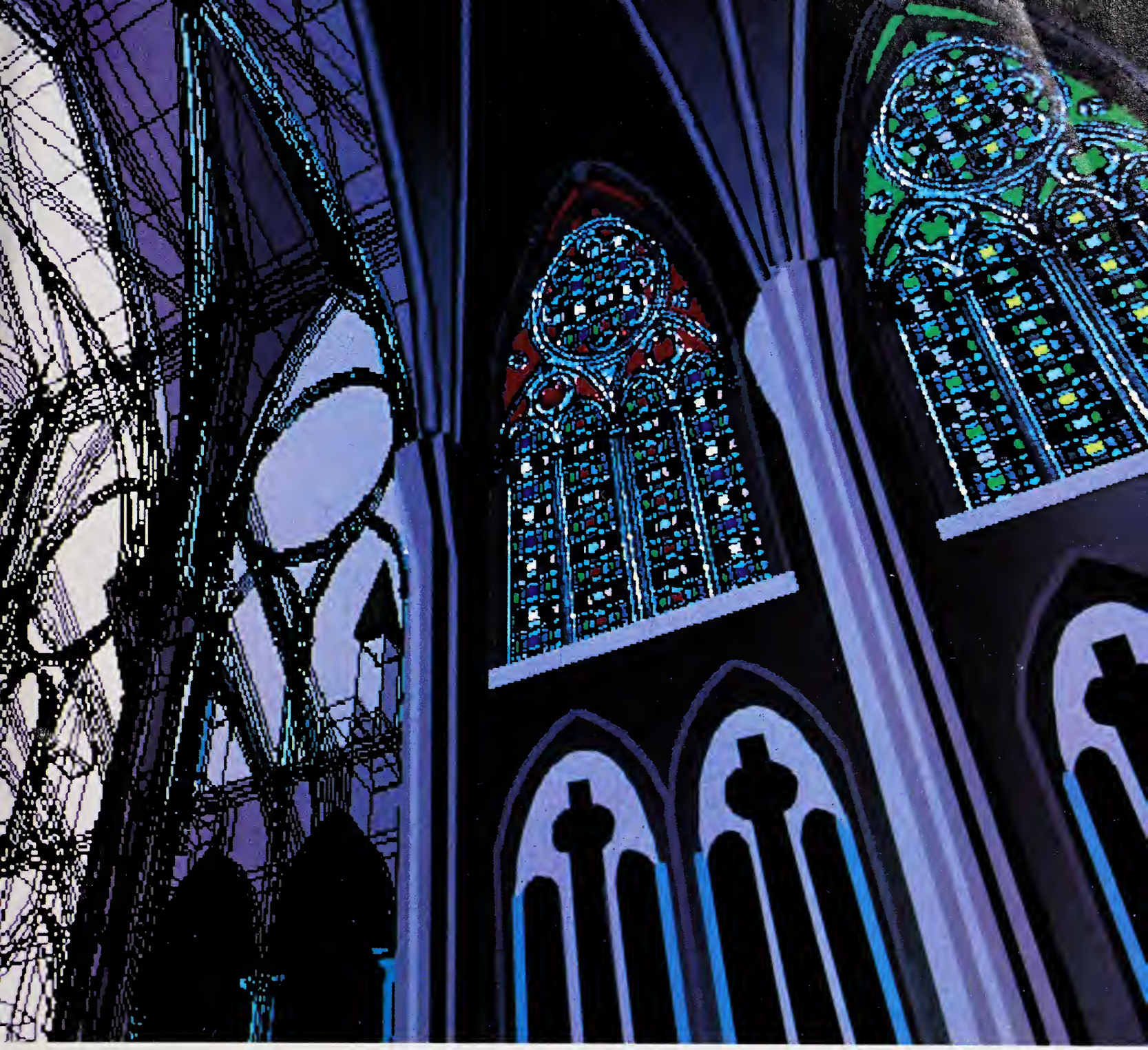

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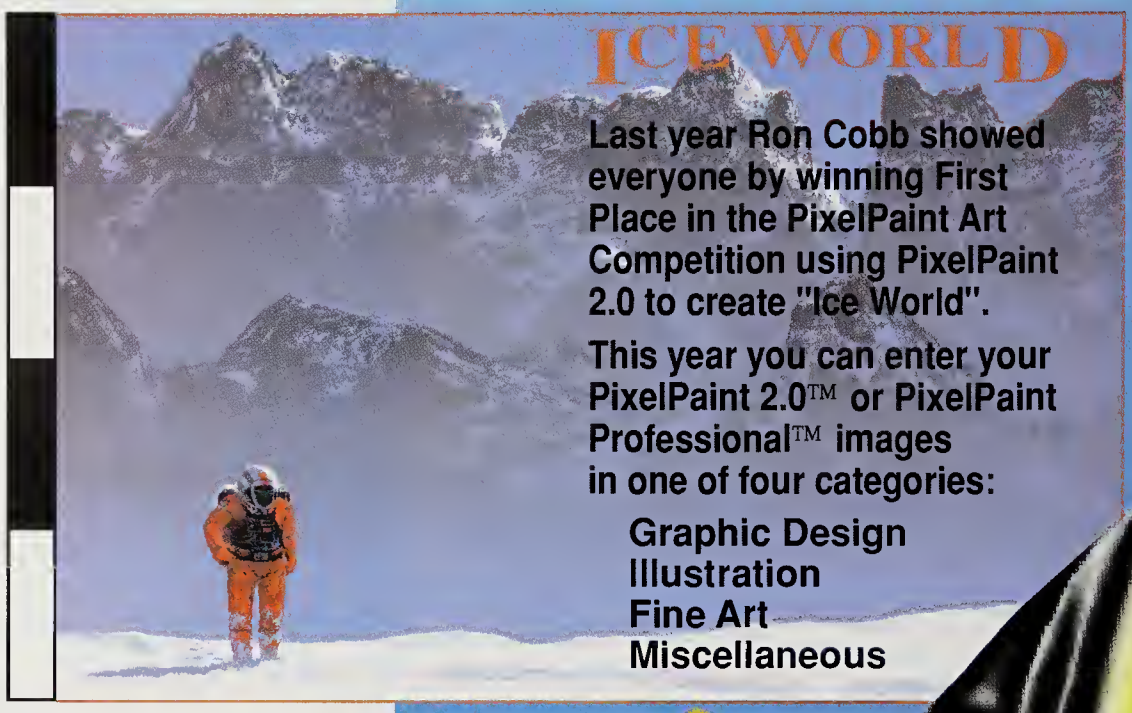

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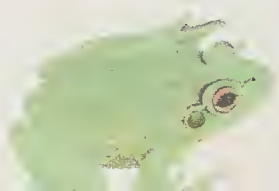

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